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ABSTRACT

Following a prefatory tribute to distinguished librarian Herbert S. White, this publication includes the following papers, mainly focused on user needs and library services in the electronic library age: "Information Technology, Users, and Intermediaries in the 21st Century: Some Observations and Predictions" (Herbert S. White); "Managing Continuous Change for Continuous Improvement" (Ellen Hoffmann); "The Impact of the Virtual Library on Library Management and Organization" (Barbara von Wahlde); "The New Campus Information Environment" (Richard M. Dougherty); "Electronically Recorded Information and the Library" (Irene Sever); "Management Development in the Networked Library" (Sheila Corrall); "Libraries of the Future: Real and Virtual" (Roland Hjerppe); "Librarians, Technology and Mediocrity" (Frederick W. Lancaster); "Introducing New Library Technologies to Faculty" (Maureen Pastine); "The Electronic Library: Virtually a Reality?" (Mel W. Collier, Anne Ramsden, and Zimin Wu); "The New Roles of Librarians in the Electronic Library: Organizational and Functional Changes in a Swedish University Library" (Gunhild Back); "The British Library: Towards the Millennium" (Stuart Ede); "From Microforms to Imaging: Document Storage in Transition" (Andrew G. Torok); "Intelligent Gateways: Functions for the Benefit of the Electronic Library" (Achim Osswald); "Wide-Area Information Server (WAIS) as the Hub of an Electronic Library Service at Lund University" (Anders Ardo and Traugott Koch); "Inter- and Intrabibliographical Relationships: A Concept for a Hypercatalog" (Eva Bertha); "CD-ROM in Heterogeneous University Environments" (Reinhard Nedela); "Successfully Managing a CD-ROM Network: Necessary Tools, Organizational Aspects, and Consequences for the Library" (Christian Heinisch); "CD-ROM Network as a Component of an Integrated Information System" (Sigrid Reinitzer); "Online Public Access Catalogs Serving Users in an Electronic Library Environment" (Ronald M. Schmidt); "ALEPH: Being Part of a Global Information Universe" (Robert Simon); "Service and Self-Service: The Electronic Library from the User's Point of View" (Maurice B. Line); "User Service Improvements Using OCR-Technology" (Morten Hein); "Understanding the Needs of Users: The Timeliness Factor" (Margaret Beckman and Ellen M. Pearson); and the "Conference Summary" (David Price). Most of the papers contain references. The seminar agenda and lists of participants and participating vendors are also included. (MES)

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# Opportunity 2000 : Understanding and Serving Users in an Electronic Library

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continued on last pages

Herbert S. White

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Essen University Library

# Opportunity 2000 : Understanding and Serving Users in an Electronic Library

15th International Essen Symposium
12 October - 15 October 1992
to commemorate the 20th anniversary
of the Essen University Library

Festschrift in honour of
**Herbert S. White**

Edited by
Ahmed H. Helal
Joachim W. Weiss

Universitätsbibliothek Essen
Essen 1993

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15th International
Essen Symposium 1992

Essen University Library

# Opportunity 2000 : Understanding and Serving Users in an Electronic Library

12 October - 15 October 1992

## Preface

---

The 15th International Essen Symposium was held at Essen University Library during the period from 12 October - 15 October 1992, with full registration of 90 participants from 16 countries. This year the International Essen Symposium was held in honor of Prof. Herbert S. White, an internationally recognized major figure in librarianship.

That Herbert White has a profound impact on education for librarianship in the United States is not a new issue. His publications and the internationally highly admired **"White Papers"** are watershed documents that shaped library aspects in an expected depth. He is a convinced professional librarian and library educator. White's general theme, approach, and profession are a way of continuous success. He is a competent colleague who had a mixed career. His analysis of problems is pragmatic but substantial with a rigorous sense and a sharp will to define and articulate what is essential and what is just accidental about our profession.

Herbert White is not only one of the most frequently nominated library leaders, most frequently selected leaders, one of the 16 perceived fieldwide library leaders but also one of the leaders in subfields in which they were chosen. Herbert White is proud of his profession and uses "the word library or librarian to identify himself in WHO is WHO in America."

Herbert White received his B.S. in chemistry from the College of the City of New York and his M.S. in library science from Syracuse University. He is now a distinguished professor at the School of Library and Information Science, Indiana University, Bloomington, Indiana, where he acted as professor, dean, and director of the Research Center for Library and Information Science during the period from 1975 to 1991. In addition, he served as senior vice president of the Institute for Scientific Information during the years 1970 - 1974.

During the previous 20 years he was executive director, NASA Scientific and Technical Information Facility, and vice president, Documentation, Inc. Bethesda, MD; program manager, IBM Corporate Technical Information Center, Poughkeepsia; supervisor, Engineering Library, Chance Vought Aircraft, Dallas, TX; technical librarian, Atomic Energy Commission, Oak Ridge, TN; special recruit intern, cataloger, bibliographer, and editor, Library of Congress, Washington, DC.

Herbert White is the author of more than 150 books and articles ranging from scholarly research investigations, topics of library administration, supervision, and library automation. He is a frequent speaker and presenter of seminars and workshops and serves, in addition, on editorial boards and as reviewer. His regular columns entitled "White Papers" in Library Journal and "Research and Reality" in American Libraries are a **must** to read for all librarians.

Herbert White is a member of the :

... American Library Association - Council 1988-1992, Committee on Accreditation, Planning Committee, Committee on the Election Process, Research Round Table Board Member;

... Special Libraries Association - Variety of posts including president;

... American Society for Information Science - Variety of posts including president;

... International Federation for Documentation (FID) - Treasurer, U.S. Council Member;

... American Federation of Information Processing Societies - Board Member;

... Society for Scholarly Publishing - Board Member;

... Association for Library and Information Science Education (ALISE)-Chair, Government Relations Committee.

Herbert White has been honored by the American Society for Information Science with its Award of Merit, Watson Davis Award, and by being named to the first group of Society Pioneers. He received also from the Special Libraries Association its Professional Award and election as an SLA Fellow. From the American Library Association he was honored by presentation of the Melvil Dewey Medal. In addition, he is the first recipient of the Distinguished Alumni Award presented by the Syracuse University School of Information Studies and the Award of Indiana Library Association as the First Lifetime Professional Award.

Leaders as Herbert White are shaped by and help to shape the agenda of their society or community. In a study carried out in 1990, Library Journal, Vol. 115, July 1990, pp.45-51, by Alice Gertzog, we read "... those in high positions in larger institutions are most directly and immediately affected by leadership..." or "...Activities of fieldwide leaders are boundary-spanning. Their efforts cross-fertilize and integrate the field..." Herbert White is one of 16 leaders of the **profession's professionals** and was identified by substantial numbers of selectors from five fields.

In one of his very early articles, and in his capacity as Chairman, Recruitment Committee, Special Libraries Association and Manager of the Engineering Library, IBM Corporation, in Library Journal, Vol. 87, 1962, pp. 860, we can read the following "...Many have come to the conclusion that it is easier to teach a subject specialist what he needs to know about library science than it is to teach a librarian what he needs to know about the subject field of the organization which employs him..." or "...we must recruit and send into the profession alert, ambitious, capable trained young men and women who can capture and hold management's respect by their abilities to do the job. If we cannot meet this challenge, then we have no right to insist on 'paper' qualifications."

In another paper of his famous classic articles "White Papers", "Managers and Leaders: Are there more differences than similarities?", in Library Journal, Vol. 115, June 1990, pp. 51-53, we can read "... By sharp contrast, management has been defined as the process by which a group called managers coordinate the activities of other people, while seldom performing them. Managers are concerned with specific and detailed decision making, organizing, staffing, planning, controlling, communicating, and directing. In other words, leaders create mechanisms so that their creation endures. They develop, persuade, or hypnotize people who will share the vision and who will set to its continued implementation. And this is where management comes in. Leaders need managers to make their vision work. Managers do the donkey work."

One of the most impressive issues of Herbert White is, "You don't have to find leaders, they will find you. There is at least one thing we don't have to worry about. The process is self-weeding. Failed leaders are former leaders. By contrast, failed managers hang around our necks forever... It is certainly much easier for the profession to preach leadership than to embrace it."

The theme of the 15th International Essen Symposium was "Opportunity 2000 : Understanding and Serving Users in an Electronic Library". The International Essen Symposium is a symposium offering creative opportunities for librarians and information professionals with concern for the future of our libraries, information institutions, and policies to discuss and to dialogue about our futures and to explore ideas and visions of the new library paradigm of the 21st century.

Traditional functions and services offered by our libraries are completely dependant on technological changes which have an immense impact and influence on our basic library philosophy and library structure. Our expectation and paradigm shift toward the library of the year 2000 depends upon our approach and adoption of new technologies. The library of the future will not have all traditional services and resources on-site. The day is not far in achieving the vision of a nationally integrated network of libraries exchanging all kinds of information in digital as well as other formats.

Not too much attention was given to past developments. The emphasis here is very much on the evolution yet to come which will be access that offers more varied sources of information making use of more sophisticated searching capabilities. If we librarians do not prepare ourselves for the future, someone else - non librarian - will surely become the information provider.

The interactions between and among computers, communications, and libraries will create the "digital libraries" with computerized information access. Our view of libraries needs to undergo fundamental changes as computers and not librarians will be the "media converters" achieving precise, quick, and in-depth connectivity. However, we can succeed in developing and making this machine a true extension of the librarian and as a device that supports human thought in every way.

The information environment is the product of developments in computing and telecommunications that have revolutionized the speed, quality, quantity of information storage, processing, retrieval, and transmission. Linked digital networks are indeed going to dominate the 1990s and are the best for "opportunity 2000". These networks encourage a shared concern for shaping libraries and the information environment: networks create and produce an enriched opportunity for extended services. The 21st century telecommunications infrastructure in a truly global information network is (and will be) the easiest and most cost-effective way to integrate libraries. However, the rapid and unabating rates of changes of the technology of telecommunications make all economic estimations - budgeting - and projections subject of uncertainty.

Our future libraries should reflect and present values that accommodate the expectations of the 21st century, where changes will be constant and dramatic. The digital information-processing revolution will shape our electronic libraries and assure that our values are consistently promoted to a network literate society. Patrons of a library may consult a library catalog or external databases without knowing or able to determine where the library system they are using ends and other systems are approached. There is no need to get out of one system and into another. The new technique is an advanced development in OSI concept as the patron is moving from one system to another quickly, easy, and smooth. However, and realistically, local patrons will be served better than remote users. Service-oriented librarians are still needed and would be guided by visions of the future that define what we want and its availability, rather than approaches based on past traditional organizational systems and functions.

The most salient points of the presentations in the 15th International Essen Symposium 1992 can be summarized in the following issues:

... the development of new technology continues at an ever accelerating rate and it is extremely difficult for us to try to shape or predict either the specific direction or even the rate of change;

... realization of the electronic library requires emphasis on an implementation perspective instead of an adoption perspective;

... the four broad interrelated areas essential to establishing and managing the virtual library to absorb new technologies are: organizational structure, human resources, planning and evaluation, and funding and budgeting during a time of budget constraint;

... electronically recorded material presents a challenge to librarians in selecting, evaluation, organization and retrieval;

... the library of the future will mainly be oriented by quality management and will thus be virtual for many users. It will primarily provide access to bibliographic records to the corresponding literature and the capability of requesting physical documents using the same PACS which obviates the need for visiting the library (mostly still absent but unavoidable). Users having access only to local information pools of an electronic library might miss a lot of relevant information networking of increasingly electronic information will be applied to serve the remote user... an important component of the strategy to deliver better services;

... moreover, intelligent gateways offer complementary functions to the electronic library by adding value on a substantial and functional level;

... technology has lulled librarians into a false sense of security and there is no real evidence that the increasing use of technology has improved library services at all. In addition, technology may actually encourage mediocrity in library and information services;

... as an example for a newly founded library, the University at Milton Keynes has set itself the goal of developing an electronic library within the next five years... teaching, learning and study environment in which information is held primarily in electronic form... will rewire the cooperation of the publishing and bookselling industries. In addition, the integrated functions in the electronic library make it necessary to develop the cooperation between the library departments and functions;

... developments in information technology and electronic publishing offer the prospect of a radically different type of academic information service;

... imaging technology and progress toward network implementation promise for improving collection development, document storage, and resource sharing;

... traditional card catalogs and their computerized version enable a user to locate a well defined “bibliographic unit“ easily, but they do not allow one to search for “library units“ without any problems. The present subject headings and classification schemes used to index library material have to be considered obsolete. The aim must be the integration of existing thesauri accepted and used by the academic community by using a “meta language“ as a software engineering tool;

... a combination of information technologies and management strategies borrowed from successful corporation would allow libraries to adopt a “just-in-time“ philosophy. Academic libraries have historically based their acquisitions planning on a “just-in-case“ model;

... libraries should be centrally involved in the development of integrated learning resources. The problem of student textbooks in heavy demand could be solved by mass-produced optical cards... libraries must aim to be totally self-explanatory and self-usable. Librarians need to become information resource managers and providers, giving more direct service to users than they do now.

As in the previous symposia our policy is to invite potential participants, lecturers, and contributors to the International Essen Symposium. All participants can exercise their experience, expertise, and judgment in fulfilling the success of the International Essen Symposium. The concerns, ideas, and needed tasks that should be considered or taken into account by librarians approaching responsibilities in their libraries are essential aims of the International Essen Symposium.

The results and outcomings from the policy of the International Essen Symposia are giving the participants, speakers, and vendors the best opportunity to meet, discuss, and to ask the questions they deem the most essential to do. This publication may provide colleagues and readers interested in the topic of the International Essen Symposium with interesting insights as presented and encourages us to continue enthusiastically in our profession.

As in the previous International Essen Symposia, the presentations and contributions were in-depth, knowledgeable, informative, and thought-provoking. On behalf of the crew of the International Essen Symposium we would like to express our sincere thanks to all speakers, participants, and vendors who added and supported to the reputation of the International Essen Symposium making it a success and enjoyable.

It is a pleasure and honor for all of us to celebrate one of the great American Librarians, Professor Herbert S. White, as a distinguished colleague honoring our 15th International Essen Symposium.

Essen, January 1993

A. H. Helal
J. W. Weiss

15th International
Essen Symposium 1992

Essen University Library

# Opportunity 2000 : Understanding and Serving Users in an Electronic Library

12 October - 15 October
1992

## Agenda

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### Monday, 12 October

| | |
|---|---|
| 10.00 | Registration |
| 11.00 | Vendors presentation |
| 14.15 | Opening of Symposium<br>**Ahmed Helmi Helal** |
| Chairman: | **Ahmed Helmi Helal** |
| 14.30 | Information Technology, Users, and Intermediaries in the 21st Century : Some Observations and Predictions<br>**Herbert S. White** |
| 15.15 | Discussion<br>Coffee |
| 16.00 | Managing Continuous Change for Continuous Improvement<br>**Ellen Hoffmann** |

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| 16.30 | The Impact of the Virtual Library on Library Management and Organization<br>**Barbara von Wahlde** |
| 17.00 | Discussion<br>Coffee |
| 20.00 | Reception |

**Tuesday, 13 October**

| | |
|---|---|
| Chairwoman: | **Susan B. Aramayo** |
| 9.30 | The New Campus Information Environment<br>**Richard M. Dougherty** |
| 10.15 | Discussion |
| 10.30 | Electronically Recorded Information and the Library<br>**Irene Sever** |
| 11.00 | Discussion<br>Coffee |
| 11.45 | Management Development in the Networked Library<br>**Sheila Corrall** |
| 12.15 | Libraries of the Future : Real and Virtual<br>**Roland Hjerppe** |
| 12.45 | Discussion |
| 13.00 | Lunch break |
| Chairman: | **Paul Nieuwenhuysen** |
| 14.30 | Librarians, Technology and Mediocrity<br>**Frederick W. Lancaster** |
| 15.15 | Introducing New Library Technologies to Faculty<br>**Maureen Pastine** |
| 15.45 | Discussion<br>Coffee |
| 16.30 | The Electronic Library : Virtually a Reality ?<br>**Mel W. Collier / Anne Ramsden / Zimin Wu** |

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| 17.00 | The New Roles of Librarians in the Electronic Library : Organizational and Functional Changes in a Swedish University Library<br>**Gunhild Bäck** |
| 17.30 | Discussion<br>Coffee |
| 19.00 | Reception with<br>Evening lecture:<br>The British Library : Towards the Millennium<br>**Stuart Ede** |

### Wednesday, 14 October

| | |
|---|---|
| Chairman: | **Look Costers** |
| 9.30 | From Microforms to Imaging : Document Storage in Transition<br>**Andrew G. Torok** |
| 10.15 | Discussion |
| 10.30 | Intelligent Gateways : Functions for the Benefit of the Electronic Library<br>**Achim Osswald** |
| 11.00 | Discussion<br>Coffee |
| 11.45 | Wide-Area Information Server (WAIS) as the Hub of an Electronic Library Service at Lund University<br>**Anders Ardö / Traugott Koch** |
| 12.15 | Inter- and Intrabibliographical Relationships : A Concept for a Hypercatalog<br>**Eva Bertha** |
| 12.45 | Discussion |
| 13.00 | Lunch break |
| Chairwoman: | **Ruth Wüst** |
| 14.30 | CD-ROM in Heterogeneous University Environments<br>**Reinhard Nedela** |

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| 15.00 | Successfully Managing a CD-ROM Network : Necessary Tools, Organizational Aspects, and Consequences for the Library<br>**Christian Heinisch** |
| 15.30 | Discussion<br>Coffee |
| 16.15 | CD-ROM Network as a Component of an Integrated Information System<br>**Sigrid Reinitzer** |
| 16.45 | Online Public Access Catalogs Serving Users in an Electronic Library Environment<br>**Ronald M. Schmidt** |
| 17.15 | ALEPH : Being Part of a Global Information Universe<br>**Robert Simon** |
| 17.45 | Discussion<br>Coffee |
| 19.00 | Reception |

**Thursday, 15 October**

| | |
|---|---|
| Chairman: | **Shmuel Sever** |
| 9.30 | Service and Self-Service : The Electronic Library from the User's Point of View<br>**Maurice B. Line** |
| 10.15 | Discussion |
| 10.30 | User Service Improvements Using OCR-Technology<br>**Morten Hein** |
| 11.00 | Discussion<br>Coffee |
| 11.30 | Understanding the Needs of Users : The Timeliness Factor<br>**Margaret Beckman / Ellen M. Pearson** |
| 12.15 | Conference Summary<br>**David J. Price** |
| 12.30 | Close of Symposium |

15th International
Essen Symposium 1992

Essen University Library

# Opportunity 2000 :
# Understanding and Serving Users in an Electronic Library

12 October - 15 October
1992

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## 1

# Information Technology, Users, and Intermediaries in the 21st Century : Some Observations and Predictions

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# Information Technology, Users, and Intermediaries in the 21st Century : Some Observations and Predictions

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## Abstract

That technology will play an increasing role in shaping our information service options appears without doubt. The development of new technology continues at an ever-accelerating rate, and since the library and information field is faced with the potential application of hardware, software, and networks initially designed for other purposes and for other uses, it is extremely difficult for us to try to shape or predict either the specific direction or even the rate of change. What we can perhaps predict, and what we can certainly hope to influence, is the extent to which information usage through our libraries and other formal information facilities will become a self-service environment at the expense of information intermediaries, or perhaps the extent to which a new profession concerned less with mechanics and more with response to service needs for information and answers rather than documents may flourish.

## 3

# Information Technology, Users, and Intermediaries in the 21st Century : Some Observations and Predictions

Operations research people tell us repeatedly that we tend to overestimate what will happen in the short term, such as the next one or two years, and that we underestimate what will occur in the next ten years or longer. We overestimate our ability to make changes in the short term because we don't fully take into account the slow process of human communication, what we generally and sometimes with contempt call bureaucracy, and of course all societies and all countries have it, some more than others. We forget that committees take a long time to meet and to reach decisions, and then that the individuals who have to approve those recommendations also take their time. Sometimes they also appoint even more committees. To a large extent, and particularly in this field, we search not for a rapid majority vote, but rather for a consensus. Consensus decisions are not quickly reached.

We tend to underestimate what will occur in the long term because we can only predict change in the framework of what we already know to be possible. We cannot really estimate the changes that will occur in other fields and in other disciplines that impact ours, without even necessarily intending to. Let me give just two simple examples from our own field. Copyright laws worked effectively when copying meant literally that - sitting down with a pen and paper and copying Tolstoy's "War and Peace". The development of dry electrostatic copying, the ability to download from computer files, the fact that the chairman of this conference and I communicated almost exclusively via FAX machine - all of these innovations had an impact on the copyright process, although the inventors certainly never gave it a thought. Copyright law had to adjust to what was now possible. That is the point about technology and its uses. If something is available and convenient, it will be used, whether it is presumably allowed to be used or not. Copyright laws had to be adjusted and are still being adjusted, to take into account not whether or not people should copy, but what to do about the fact that they will most certainly do so.

My second example concerns the whole issue of database searching from a terminal that might be located in a computer thousands of miles away. That wasn't really anticipated, either, certainly not by the library profession. The original premise of computer architecture was that one input/output device would be hooked to one central processing unit. That was found to be terribly inefficient, because CPUs work more rapidly than I/O devices. The approaches we have developed to permit online searching use an advantage that was there for us to use. Not only libraries, but also banks and airline reservation systems are the beneficiaries or, if you prefer, victims of this development. If someone in our field had predicted online searching when computers were still gigantic vacuum tube devices, such an individual would not have been believed. What will happen in the next year or two? Probably less than we think. What will happen by the year 2010? I don't know, but the changes will be gigantic and dramatic. The one thing we can safely predict is that there will be massive change, and that technology will play a heavy hand in the process. Because, as we meet here, hundreds of thousands of highly qualified specialists are working to bring us new enhancements, whether we want them or have asked for them or not. These are probably not primarily designed for us, but many of them will work for us, precisely because information files are large massive record files of which we ask relatively simple questions, at least compared to the adjustment of a space vehicle reentry trajectory. Those kinds of files in our libraries look very much like the files in accounting departments, in banks, in insurance agencies, and in warehouse and stockroom activities. Money will assuredly be spent to enhance the efficient use of these.

It is also difficult to measure the impact of technology because the availability of a technology brings its own needs and own uses. Before I worked at the NASA Scientific and Technical Information Agency - the US space program's information system which I headed between 1964 and 1968 - nobody did frequently cumulated indexes and bibliographies because it was too difficult, too expensive, and too time consuming to do them. Once the ability became apparent, we decided that we had really needed them all along. Cost comparisons between manual and computerized systems therefore become meaningless. Computerization almost never saves us money, it ends up costing more. However, the question is how much more do we get, and is it important for us to have it? Cost effective and cheap are not the same thing.

I am a pragmatic user, and neither an enthusiast for nor a hater of computer applications in our institutions. The question is still, as it must always be, one of what it is we want to accomplish, and whether machines can help us to accomplish it. If we manage to produce something rapidly and efficiently but it is something nobody wants or needs, is that a benefit? Hardly. At the same time, I think it is important that we use the opportunity that developing technology brings us to destabilize our institutions, and to create an awareness of wants and needs, particularly wants and needs of which users had not even been aware.

That is the issue of marketing, and bureaucrats are not very good at it. It is the creation of the awareness of a need that people didn't even know they had. It means saying to people: "We don't do this now, but if we were to do it would it be useful to you?" That creates pressures on the budgetary process, but I happen to be an admiring reader of the writings of Peter Drucker. In the absence of money there is always money for something that is really worth doing. And: It is easier to get a lot of money than to get a little bit of money. That is because there is more excitement and reward in major changes than in small incremental modifications. It means that, for libraries, it might be easier to justify six more reference analysts with terminal and data base access to do something for our clients that we have never done before, than it is to justify one more clerk because the backlog is so large. Nobody wants to approve a new clerk, because that cost is real and the justification is boring. For me perhaps the clearest example of a successful marketing destabilization approach is the one used by telephone systems on an international basis. Telephone companies once argued that people needed to have phones, one phone per household or office. Basically that was accomplished a long time ago, at least for the people who would buy phones at all. Having done this, I suppose they could have congratulated themselves and stopped. However, we now have color coordinated decorator phones, multiple phones in every home, automobile phones, airplane seat phones, cellular phones, call forwarding, call interrupt, and many other features. We didn't even know we wanted or needed all those things until the phone marketeers showed us how valuable they would be to have. And this, of course, brings me to yet another Peter Drucker quote: "In the provision of a service or of a convenience that people really want, cost becomes irrelevant." It is easy to see that in stressing the freeness rather than the goodness of what we librarians do, we may have been stressing the wrong value.

The matter of creating a destabilized and unsatisfied clientele is particularly important to us, because the absence of information is easy to rationalize. At first glance, that statement may seem strange. After all, our whole world culture now accepts the premise that information is important, that knowledge is crucial, and that ignorance is not acceptable. Nobody, in government, industry, or academia, is likely to say "I don't know anything, but I don't care."

However, whether or not people really have information that they need is not as easily or exactly determined. In talking about this to my students, I stress to them that the impact of the deprivation of vitamin C is easy to demonstrate. We put two groups of rats into cages. One group gets a balanced diet, the other a diet without vitamin C. The second group becomes sick and dies. Point proven. However, how can we do this in the information field? Do we put our users into cages? Can we even assure that, if we don't give them information, they won't get it elsewhere without ever telling us? Perhaps the alternative information cost is greater, but that doesn't matter if they can miscode the cost to fool the accounting system. There is also the endless ability to rationalize. Calvin Mooers[1] told us more than 30 years ago that, in any information environment in which people know that there is more information than they have, but that it becomes too troublesome to get it, they will pretend that there is no information available at all. They aren't really aware of lying. Eventually they persuade themselves. I have seen the validation of Mooers' Law many times over. People with small and weak libraries who only get to see a half dozen journals in their field will insist stubbornly that this is all they need to see. What choice do they have? They can't admit that they don't know what they are talking about. I've never seen a meeting scheduled at 10AM on a Monday morning canceled because the presenter admitted that he had been unable to get what he needed from the library. Whatever he got just fortunately always turned out to be enough. Indeed, librarians know that if they later find information that contradicts what has already been said, they provide that information at their peril. Those of us who work in universities know that unlike the popular perception, academic as well as industrial and government research is not usually a search for truth, whatever that might be. It is a search for proof, for something we have already postulated to be true. In fact, it was on the basis of persuading people that the assumptions were probably correct that the research funds were granted in the first place. If they report, three years later, that they were wrong, but isn't everyone glad to know?, they severely jeopardize their chance to obtain future funds.

The information process is therefore, with or without technology, very susceptible to self-deception and self-delusion. There is obviously risk for us in attempting to spotlight this, but I would argue that we should, in the most pleasant and reassuring manner possible. We should stress that it is indeed now possible to get more complete, more rapid, more accurate information. All it takes is money, and money is still the easiest thing to get provided that people understand that terrible things will happen if it isn't provided. We have not stressed that issue very well. If properly used, technology in the field of information provides wonderful opportunities, precisely because it has the potential for being a great democratic equalizer. Because both bibliographic access and document delivery are now relatively simple - we are dealing in issues of minutes and hours instead of days and weeks - perhaps at most a day or two - there need no longer be a country, location or individual deprived of needed information. The issue, we should certainly understand and tell others, is not ownership but access, and I urge my colleagues in university libraries in the United States to answer questions about the size of the library holdings by questioning the significance of the issue. They should stress that ownership has never assured access, and it is access that really matters. Trueswell told us[2], from his vantage point in operations research at MIT, that our chance of getting things today is only 50% even if the material is owned. Trueswell saw few options except in the rigorous application of the laws of Bradford in buying multiple copies of heavily used material and not buying material not likely to be used at all. That was a risky and traumatic recommendation at the time of Trueswell in dealing with users more fascinated with holdings than with access, but technology has eased the bite of that decision option. If we don't have it, we can still find it bibliographically and deliver it as well. We have done better with bibliographic access than with document delivery, but that is largely because we have refused to revise some of our rules and assumptions. As an example, I find that in many libraries material will not be borrowed if it is owned even if its own copy is not available. As though that mattered to the user. For him the request is a binary process. Either I get it or I don't. However, we insist on a full range of explanations that are really only unwelcome excuses. In addition, we may insist that when we do borrow something the user must pay, although the user was totally innocent in our decision not to buy the item in the first place.

What I am arguing is that even as we look at technology as a series of service options, we have largely failed to modify our decision mechanisms to take into account the new options we now have. Is this because we are largely a conservative and cautious bunch, imprinted by our managers to worry more about money than about service? Perhaps, at least some of us are. However, to a larger extent our users are even more conservative than we are, in part this is because they are uninformed. We have not radicalized them to expect more, and as a result we find a great deal of good will for the library as a good institution. Indeed they think the library is good no matter how bad it really is, except that perhaps it might be nice if we added a few more journals in their discipline. Having the library assumed as a good thing run by nice people will probably protect our jobs, but it will not help us to make dramatic changes. As technology has brought options and opportunities it should change options, and for this we must radicalize our users. Individuals I have interviewed in my consulting assignments accept the premise that sometimes the process of acquiring something from another library takes several weeks or months, and they are surprised at my suggestion that they simply state that such a delay is unacceptable. Could we do better? Of course we could. Using technology to its potential takes money, and money comes with an understanding that it is worth spending, or that important people want it spent. Without that understanding the money doesn't come at all.

Even as we may fail, in part because of a lack of staff or a lack of money, to make users aware of new options and new potentials, other rivals of ours are doing it. Unfortunately, in this process they tend to bypass or ignore the library entirely, and to simply relegate our role to the warehousing function of supplying an item once the needed item has already been identified. This is the siren song of stand alone end user searching. There are many participants in this strategy. They include database vendors, and their preference for dealing with end users rather than with librarians is easily understood. End users are more prestigious, end users have more access to money and are more likely to spend it. They might do more searches, and if they do them sloppily so that they cost more, that's not bad for vendor income, either.

They include government agencies that try to build one-to-one linkages with the professionals in the disciplines they are chartered to serve, in my view largely because this brings more prestige and visibility. Almost 30 years ago when I worked in the space information program the suggestion that astronauts in their flight suits might want to do an on-line-search just before entering the capsule was not discouraged, although it was really silly. The most obvious example in the United States today is the National Library of Medicine, which suggests through its Grateful Med program that searching medical information on the physician's own terminal is easy and can be fun. The message that you don't need a librarian or information specialist is not specifically sent, but it can be inferred, and is indeed inferred and implemented by administrators who close libraries and fire librarians, all the while professing a support for information service. Finally, they include some librarians, who may have a fascination with training users to do their own searching. I am not exactly sure why, except for the observation that the value system of the librarian as educator and the librarian as information intermediary lead us to contradictory emphases. In the one it is important that the user learns how to serve himself. In the other, it might be preferable that the user knows only whom to ask, without worrying about how this magician then goes about his work. I spent the first 25 years of my career as a special librarian. The motto of the Special Libraries Association, which has international chapters, is "Putting Knowledge to Work." In other words, knowledge is only significant if it is used. Perhaps this can be contrasted to an emphasis on putting knowledge on the shelf in the hope the people will find what they might consider useful.

I obviously have my own strong personal feelings about the issue, particularly in an evolving technological emphasis, of user self sufficiency versus the use of surrogates, but will acknowledge that the question has no simple and direct answer. Whether or not end users can do better or cheaper searches is an issue that should be addressable through structured research, but it seems unlikely to me that self-service will result in greater cost effectiveness for the end user, given the difference in salaries. We must be careful not to couch the issue in terms of a moral concern, that somehow end users should do their own searches because that is a more ethical approach. It differs to me very little from the question of whether or not automobile owners should repair their own cars.

Who are the end users, anyway? As it turns out, they are many and varied in number. Herbert Brinberg[3], in a talk delivered at the FID Copenhagen meeting, differentiated among three types of information users in a formal information setting. There are the pure researchers and scholars, who seek only raw material, from which they will devise their own evaluation and strategies. Charles Osburn[4], a noted humanist and librarian, has postulated that in academia we treat all users as though they were pure and basic researchers and scholars, whether or not they really are. Brinberg suggests a second group of information users, whom he calls those primarily involved in practice and engineering. These people are looking for answers to their questions. Brinberg's third group are managers, who are not looking for sources of information or specific answers, but who are looking to learn what their plausible options are. Some present day librarians might serve Brinberg's second group, but I suspect that virtually none serve his third group. However, they exist everywhere, including universities.

What are the numbers of these basic and pure researchers whom, according to Osburn, we serve as though they represent everyone? In the United States, at least, there is evidence that there are very few of them. A 1990 survey of faculty by the Carnegie Foundation[5] showed that 28% had never published anything, and that another 28% had published nothing in the last five years. That is more than half. More than half had never published a book or a monograph, and only 6% of academic faculty members saw their primary role as research, as contrasted to teaching.

We can also be suspicious of suggestions that, simply because individuals now know how to use terminals, they enjoy the process of searching for information, if they could be doing something else. There are undoubtedly some who do, and there is no question that the terminal in your office is a useful device for a specific fact or document look-up. However, many senior researchers and particularly executives still consider anything with a keyboard as a clerical device. A long time ago, when I still worked for IBM, an internal survey which was obviously not publicized learned that the executives who had terminal access to all sorts of day-to-day financial and production data preferred to call their assistants to their office or on the phone to tell them to look up the information for them, and then provide either an oral report or a one page summary. The reason the terminals still have printer attachments and that, despite Lancaster's projections[6] we now produce more paper than ever in the information process, is because people adapt systems to themselves and their convenience and preference, rather than adapt themselves to the system. It is something that the administrators of libraries could remember as they deal with systems analysts and systems manufacturers.

We have been told that the new round of computer systems are more user friendly than ever, and by that I suppose that they can allow the unsophisticated user to bypass a great deal of complex logic. However, when I last looked, computer terminals still tended to be rude. The response "invalid command" is not a pleasant greeting from an inanimate object, particularly when we are positive we have done nothing wrong, and most particularly when we consider ourselves to be more important than a machine. Telephone recordings, as we know, are just as rude as their price for what is seen as efficiency. The entire question of end user versus intermediate searching is, for me, a moot rhetorical point. We should allow the end user to interact with the system at his level of preference. This is not a moral issue. Users will probably opt for a mixture of self-service and intermediate service, with a heavy concentration on the latter for complex and time consuming issues.

However, this will only happen if first we don't rig the economics so that end user searching appears to be cheaper even when it is not. Cheaper for the library is not necessarily cheaper. The issue is not who pays, but what does it cost for the entire organization. Unlike many of my colleagues, I like dealing with accountants and other financial managers, because they understand that point very clearly. They understand that money is money, no matter where it is hidden. Their agendas are simple and easy to understand, and they could be allied to ours. Secondly, the use of intermediaries depends on trust. Trust cannot be edicted, and it cannot be demanded. It is built one relationship at a time. A user does not interact with a library. He interacts with human beings who, if we are fortunate and have chosen well, are impressive professionals who work in the library. I find it hard to understand why some might think that users should willingly interact with whoever answers the phone or happens to be at the desk. We have favorite barbers and hair stylists, favorite supermarket clerks and bank tellers. Why not favorite information intermediaries?

I believe that, unless we restrict the process by either imposing some sort of morality standard that edicts self-service, or by practicing false economics, our future can be very bright indeed. I base that belief both on the recognized importance of information and on its growing size and complexity, and on the general societal preference for intermediaries. We know that in the more developed nations an overwhelming and still growing part of the work force is not in production of either goods or agricultural products, but in the service sector. Who are the people in the service sector? They are intermediaries. The world likes intermediaries because they make us feel important.

If we are to stress the options that information users have, it is important that they understand both those options and the full capabilities of the everchanging information engine. I find that in my consulting work, particularly in the corporate sector, users do not know what the full range of information options are, and therefore they accept what they have because they don't know there is anything else. We must remember that many professionals have worked in one organization for 15 or 25 years, and many have never worked anywhere else. Deferred retirement benefits discourage people from changing jobs. If they know only one information system, how do they know whether it is as good as it could be? We must be careful in the way we structure user surveys, because these may yield not only ignorant but dangerous responses, dangerous in their naive acceptance. If you are going to undertake user surveys, at least make sure that you ask them about whether they would want things that are at least technologically feasible but that are not now being provided, usually because of a cost constraint. Would they be interested in any of these? As Drucker has noted, the emphasis in management communication must be on exception reporting, not on what we are doing well. We will report that in any case. People like to brag. The emphasis must be on what we are not doing, or not doing well, on why not, and on what could be done about it.

If we do all of these things, then the options that technology offers to those of us who work in the information professions will be rich and varied. It will require continued monitoring and assessment on our part, and it will require use of that much-maligned skill, vision. Bear in mind that the outflow from the technology mills will be endless, and that the people producing this will not necessarily understand what we do and why we might or might not need what they have developed. They will try to sell it to us in any case, as most salesmen would. We have to know what we need, and we have to know what we might find useful. That means that we must understand what we are not doing but wish we could do. We must not forget, in the pressure to deal with daily crises, that dreaming is part of management. We must remember that, particularly in academia, battles over territory are fought most ferociously because the stakes are so small. Territory, or turf, comes from being able to do something nobody else can do. They must come to you for help because you are the experts and they are unqualified. Doctors and lawyers - even automotive mechanics - understand this clearly. Do we?

If we remember all of these things; if we now look at technological options as opportunities rather than dangers, forgetting at least for the moment the problems and particularly the financial issues, then our future is potentially quite bright. Information will play an increasingly important role in all of the fabric of society. At least I am convinced that the role of information intermediaries, the ones who provide the linkages, will grow in size and importance. I am equally convinced, however, that if we don't do this somebody else will. These people probably won't do it as well or as cost effectively, but since information intermediaries largely get to define their own territory and mission, users may not even know that.

If that happens, then our future would not be bright at all. Because the historic function that society identifies with the library profession still focuses on the acquisition of material in one centralized physical location; its careful and unique analysis; and the process of maintaining inventory control records over what is in and what is out; we must recognize that these are precisely the functions that will become either irrelevant or increasingly computer routines. Further improvements in bibliographic access and in document storage and delivery are a certainty, and that means that the entire premise of the library as a set physical location with doors and windows must not be allowed to define the information window on the world. Furthermore, the premise of digitized storage and rapid and cheap reprographic techniques will make the tedious process of circulation records and overdue notices irrelevant for all material except for that where format is more important than content, primarily rare books and manuscripts. For other material we are looking at a throwaway technology. I know about existing copyright laws, but copyright laws will adapt to the inevitable because they must. Hopefully the throwaway technology will feature biodegradation and recycling. I am also aware of the suggestion that we have a role as information advisors, something of a restatement and refinement of the librarian as teacher role. I have no problem with our being both intermediaries and advisors, but I am less certain of the guarantee of the second role. It is the equivalent of preventative medicine - of people going to doctors when they are well and not just when they are ill, to make sure that they stay well. That is desirable, but it doesn't happen very often. Nor do I think our role as advisors is assured if, as I suggested, people don't know what it is they don't know, and pretend they do know. Physical illness has clear symptoms, information illness often has none. I am not as prepared as some of my colleagues to assume that individuals will want to do their own information work just because perhaps they can. Of course they can if they must, but why do we have a stake in forcing them to? I have no more reason to suspect that people want to do their own information work than I think they want to fix their own cars when there is something else to do, something they think is more worthwhile or more enjoyable. From my observation few people want to do information work, and academic libraries have already found that sometimes faculty training for self service turns out to be secretary or graduate student training. This helps nobody, but least of all us. If you want to teach faculty, then at least insist that they all come personally to be taught and advised.

Nor do I think our role as advisors is assured if, as I suggested, people don't know what they don't know, and pretend they do know. Physical illness has clear symptoms, information illness often has none. I do not see these issues as contradictory. I see them as providing us with additional options. They are exciting options, but we won't have them forever. We most certainly won't have them if we decide we don't want to do any of this work because we are already too busy, because our staffs are so small, and because we have no money. That is the surest strategy for never getting any.

## References

1. Mooers, Calvin N. "Mooers' Law or, Why Some Retrieval Systems Are Used and Others Not." American Documentation 11:204, July 1960.
2. Trueswell, Richard. "Some Behavioral Patterns of Library Users: The 80/20 Rule." Wilson Library Bulletin 43:458-61, Jan. 1969.
3. Brinberg, Herbert R. "The Contribution of Information to Economic Growth and Development." Proceedings of the 40th Congress of the International Federation for Documentation, August 18-21, 1980. p. 23-36.
4. Osburn, Charles B. "Academic Research and Library Resources; Changing Patterns in America." Westport, Conn., Greenwood Press, 1979.
5. Boyer, Ernest L. "Scholarship Reconsidered; Priorities of the Professoriate." Princeton, N.J., Carnegie Foundation for the Advancement of Teaching, 1990.
6. Lancaster, F. Wilfrid. "Libraries and Librarians in an Age of Electronics." Arlington, Va., Information Resources Press, 1982.

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# Managing Continuous Change for Continuous Improvement

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## Abstract

At the symposium last year, J. Andrew Braid discussed eight barriers to change, and described the human barrier as the most difficult. Change is a multidimensional social process.

Planning for the electronic library must include planning for the political and symbolic facets of changing. Change is a process of adoption, implementation and continuation. Decision-makers tend to focus on the adoption phase and practitioners on the implementation phase. Realization of the electronic library requires emphasis on an implementation perspective instead of an adoption perspective.

# Managing Continuous Change for Continuous Improvement

> There is something I don't know  
> that I am supposed to know.  
> I don't know what it is I don't know,  
> and yet am supposed to know.  
> And I feel I look stupid  
> if I seem both not to know it  
> and not know *what* It is I don't know.  
> Therefore, I pretend I know it.  
> This is nerve-wracking since I don't  
> know what I must pretend to know.  
> Therefore, I pretend I know everything.
>
> R.D. Laing, *Knots*, 1970

It is a pleasure to return to Essen. It was, however, with some dismay that I learned I was to follow Herb White on the programme this afternoon. I know what a provocative columnist he is. Furthermore, he speaks frequently at Canadian library conferences and inevitably for six months afterward, librarians at York are quoting Herb White--usually to convince me to do something differently.

I begin with a disclaimer. The term continuous improvement is used in the title because I believe it is how we should be creating the electronic library. I regret that the term has become associated with Total Quality Management, a philosophy or method about which I am underwhelmed. This is not a paper about TQM, but an exploration of change as a process.

At last year's symposium, Braid identified eight barriers to introduction of new technology; the first seven present a daunting challenge. The eighth factor, people, he characterized as the most difficult.[1] It is that factor, and particularly the social aspects of change which I'd like to examine. Change is a multidimensional social process and those responsible for scholarly communication must manage the political and psychological aspects of change as well as the technical and economic factors. We will impede achievement of the electronic library through overselling and oversimplification if we ignore the realities of social change.

The literature of educational reform can provide insight, if not encouragement, for comprehending the change process in organizations. Thoughtful critics are examining three decades of reform efforts in North American elementary and secondary schools in an effort to understand why desired change has been so elusive.

Analysts of educational reform distinguish two stages in the change process: adoption (or initiation) and implementation. The people, the tasks and the time frames differ in the adoption and the implementation phase. The costs and the benefits for participants are also different because policy-makers who innovate and practitioners who implement innovation do not share the same perspective. "Central decision-makers know the complexities of the adoption process; practitioners know the complexities or the implementation process. They live in two different subjective worlds."[2] What is resistance to change from the perspective of the policy-maker is reasonable planning from the perspective of the implementor. A long-time participant in social change observes that "educational reformers have trouble understanding that change by legislative fiat or policy pronouncements from on high is only the first and the easiest step in the change process.... Insensitive as they are to what the change will activate in the phenomenology of individuals and their institutional relations, they confuse a change in policy with a change in practice."[3] The title of a recent *Journal of Academic Librarianship* editorial, "Implementing the Vision," reflects the dual tasks before us.

This is a paper of exploration, not resolution. From the viewpoint of a sometime adopter, sometime implementor, it describes aspects of the different realities of the policy-maker who adopts the changes and the practitioner who implements the changes that will create the electronic library. I believe Fullan is correct in his conclusion that we don't need a detailed plan for change. A dynamically complex endeavour such as creating the electronic library confounds rational planning. We do need an understanding of the change process and an ability to influence the process.[4]

## Adoption

There are a number of reasons, beside merit, for decision- or policy-makers to initiate change. These reasons are as common in universities as in school boards, and include:

for symbolic or political benefit

for career advancement

response to peer pressure

to appear innovative

to gain more resources[5]

The political and symbolic value of adoption is often of greater significance than the merit of the innovation. In organizations with abstract and unclear goals, with few performance measures and a non-competitive market, it is frequently more profitable politically and bureaucratically to “innovate“ without risking the costs of real change. Innovations adopted because of their symbolic value “may be necessary for political survival, may be necessary first steps which set the preconditions for real change in practice, or may represent the only change possible in certain situations.“[6] Bolman and Deal's interpretation of organizational structure and process as theatre confirms the importance of the symbolic as well as instrumental activities in organizations.

“Rather than admit that the ambiguity may not be resolvable or the uncertainty reducible, individuals and societies create symbolic solutions.“[7] If publicity value is the major rationale for innovation, then verbal adoption may be sufficient. Certainly, policy-makers learn to caress the themes that garner support and avoid opposition.

A cynic could conclude that one of the main consequences of introducing innovation is career advancement. For about half the participants in a large scale study of educational reform, adoption of an innovation was a vehicle for moving in, moving up, or moving away. Policy-makers were not necessarily manipulative, but were simply looking out for themselves and capitalizing on opportunities crossing their path.[8]

Pressure for innovation can come from peers and from professional associations. In the absence of clearly defined performance measures whatever is popular among leading professional peers can be the determining criterion for adoption of new technology. National professional organizations influence adoption. They have a responsibility to anticipate needs and an activist ideology. They also have a self-interest in maintenance of their organization. Thus, there is a bias toward change. The free trials and limited time offers from vendors are another pressure for change.

The motive of external resources is frequently linked to the motive to appear innovative. Every administrator knows that it is easier to obtain additional resources for new projects than for the maintenance of existing projects. The availability of external resources is a powerful stimulant for adoption. Even costly innovations can be relatively easily adopted if someone else is paying.

Symbolic or political benefit, career advancement, peer pressure and external resources are reasons in addition to defined need for adopting innovation. These are the realities and the values of the policy-maker, and they are rational motives for adopting change. Implementation decisions need to be cognizant of the multiple reasons for innovation.

## Implementation

Concern for implementation is the lesson from students of educational reform and, increasingly, from library leadership. The resources--of time, of technology, of money, of political will and social skill necessary to accomplish implementation must be adequate to the task. Sarason accurately concludes that "changing a system is not for the conceptually and interpersonally faint-hearted."[9] Policy makers cannot leave it to the less powerful or less knowledgeable or less committed to initiate and sustain the implementation process.[10]

Dick Dougherty and Carol Hughes use the term transitions rather than the term implementation, but come to a similar conclusion after the Preferred Futures workshops. "Very few campuses seem to have thought through these questions, which unfortunately represent only the tip of the iceberg of 'universal access.' One is left with the general impression that, in spite of what campuses term 'strategic planning,' efforts to date have fallen dramatically short of what will be required. More likely, campuses are identifying strategic directions they wish to pursue, but have not yet become specific about what resources are necessary and available to get them to the future they desire."[11] Nancy Eaton observed in a recent address that "the electronic library currently is a concept without much detail attached. If it is to function in a way compatible with our vision of information services, the major research libraries must work into their agendas direct participation in ... research and demonstration projects."[12] In the next paper Barbara will report how this is occurring in some North American libraries. Anne Woodsworth asks why libraries are hesitating about the shift from ownership to access and concludes that "librarians have had neither the time nor the capital to implement a sensible shift in philosophy and operations...."[13] The shift will require an implementation perspective.

Implementation must identify and confront the situational constraints and the subjective realities of practitioners. Whether the scope of change is large or small, implementation will be incremental. "Those interested in large-scale change should pay attention to implementation detail, to how they are going to move from one phase to another and make revision along the way. Vagueness and grandiosity is the problem, not large-scaleness per se. Abstraction and vague or nonexistent plans are the bane of implementation. Concreteness is common to success in both large-and small-scale change."[14]

The most serious situational constraint in implementing the electronic library is the financial condition of higher education. Implementing the electronic library means recognizing the subjective realities of librarians and professors. Those realities include overload, the personal costs of change, and the isolation of professional practice.

The focus of this paper is on the social, not the financial, aspects of technological change. Economic constraints cannot be ignored. The library leaders I cited earlier all emphasize economic realities. Dougherty's acknowledgement of "winners" and "losers" in the reallocation process hints at the political skills that will be demanded.[15]

Turning to the social aspects of implementation: controlling overload is a key implementation task. The incoherence that results from uncritical and uncoordinated acceptance of too many different innovations is a greater impediment to successful implementation than resistance to change.[16] Successful implementors learn to decide when not to attempt a change, to select a smaller number of changes and do them well, to avoid hopeless and wasted efforts. Different time perspectives exacerbate a sense of overload. Policy-makers have an adoption time perspective, not an implementation one. What to the policy-maker is resistance to change is rational preparation to the practitioner. Implementation must be conceptualized as a process which takes time. Even William Arms at

Carnegie Mellon, recognizes that "transferring from a paper to an electronic library is a 25-year project."[17]

Innovation has direct costs for the practitioner. Academic library administrators must consider the costs for faculty members, and to a lesser extent students, as well as the costs for librarians. "The rhetoric of innovation underestimates, if it does not totally ignore, the real costs of attempting something new....Especially at the beginning, innovation is hard work. It takes extra time and energy...[and] can add significantly to the normal workload. As for increased competence on the job--another incentive--it is more likely that our competence actually decreases during the first attempt at trying something new...."[18] A practitioner who is expected to finance the innovation with personal effort, is in effect depleting professional skills without recompense. This is a poor investment, and avoidance or resistance is not surprising.[19] A knowledgeable and sympathetic faculty member at Barbara's university has written about the electronic library, "from the bottom up." He concludes that "the problems currently outweigh the advantages" because "the piecemeal programs that have been put into place simply do not work well."[20]

Innovations are acts of faith. They require one to believe they will be worth the investment, even without the hope of an immediate return. House suggests that the amount of time and energy required to learn new skills and roles is a useful index to the magnitude of resistance. Most librarians and professors, like the teachers whom he studied, live in a scarce economy. Resisting new ideas is a way to deal with an environment one doesn't control. Those who feel powerless limit themselves to low-risk situations, especially if social and economic costs are involved.[21] The cost/benefit calculus of innovation and tradition frequently favours tradition. In his summary remarks at the symposium last year, Maurice Line noted that "while libraries may be conservative, their institutions are often much more so, particularly academic institutions."[22] Depending upon one's viewpoint, this conservatism may be an obstacle to change or may be a protection against thoughtless change.

The autonomy and privacy of professional practice are another aspect of the subjective reality of practitioners which mitigate against implementation. Lortie found that teachers work in isolation, that there is a norm of not sharing or discussing each others work, and that teachers lack a common technical culture.[23] Librarians do not work in individual classrooms as teachers do, but I believe the prevalence of recommendations for more communication in virtually every library study is confirmation that academic librarians share this lack of serious sharing about our craft. Implementation of the electronic library will demand not only that librarians overcome the isolation from each other, but that the definition of colleague expand to include the computer centre and the professoriate. It is tasks like this--fostering the cross-professional teams and the discourse that will create the electronic library--which mean the implementation time perspective is a long one.

Successful implementation must overcome the isolation of librarians from each other and from other professionals on the campus. Unfortunately, "privatism and professional development are closely (and inversely) linked.... We are not used to receiving and giving help, or to minimizing the judgmental nature of feedback."[24] New concepts, skills and behaviours will not occur without ongoing, interactive cumulative learning. Too often staff development occurs only during initiation but "no matter how much advance staff development occurs, it is when people actually try to implement new approaches that they have the most specific concerns and doubts."[25] What is needed is support during implementation, and frequently the best support should come from peers. These exchanges work best in small-scale, focused and ongoing groups. Electronic mail means that groups can be professionally close, but geographically distant.

The importance of personal contact in the diffusion of innovation has been known for years. In studies of schools, the most trusted and influential contacts are fellow teachers. The encouragement of exchanges among peers about the natural problems of learning new skills and roles should be a high priority for successful implementation. Continuous improvement requires frequent and concrete talk about practice. Contributing ideas to others and seeking better ideas are the cornerstones of collaborative cultures. Such conversations will create a shared language about the tasks of the electronic library. Sustained interaction and staff development are crucial regardless of what the change is concerned with; the more complex the change the more interaction is required during implementation.

## Conclusion

We need to create an "organizational culture that makes self-correction a norm and not a war" or a judgment.[26] Implementation is a process of clarification, a process that includes some transformation of the initial innovation.

Adoption and implementation of change are interactive and interdependent. Pressure for change without support will lead to resistance and alienation. Support for implementation without pressure for change will lead to drift and waste of resources.[27] The challenge is to find the balance between pressure and support, and even more difficult, to keep the balance in a dynamic environment.

## References

1. Braid, J. Andrew. "Barriers to the Introduction of New Technology." In *Libraries and Electronic Publishing: Promises and Challenges for the 90s,* 14th International Essen Symposium 14 October - 17 October 1991, edited by Ahmed H. Helal and Joachim W. Weiss. Essen University Library, Essen, 1992. pp. 1-16.
2. Fullan, Michael. *The Meaning of Educational Change.* New York: Teachers College, 1982. p. 68.
3. Sarason, Seymour B. *The Predictable Failure of Educational Reform: Can we Change Course Before it's Too Late?* San Francisco: Jossey-Bass, 1990. p.101.
4. Fullan, Michael G. *The New Meaning of Educational Change.* 2d ed. Toronto: Ontario Institute for Studies in Education; New York: Teachers College Press, 1991. p.103.
5. Fullan, 1982. p.22.
6. Fullan, 1982. p.51.
7. Bolman, Lee G. and Terrence E. Deal. *Reframing Organizations: Artistry, Choice and Leadership.* San Francisco: Jossey-Bass, 1991. p. 288
8. *People, Policies, and Practices: Examining the Chain of School Improvement.* Vol. IX, Implications for Action. Andover, Mass: Network, Inc. 1982/83. p.34.
9. Sarason, p.46.

10. Sarason, p.105.

11. Dougherty, Richard M. and Carol Hughes. *Preferred Futures for Libraries: A Summary of Six Workshops with University Provosts and Library Directors.* Mountain View, Calif.: The Research Libraries, Group, 1991. p.14.

12. Eaton, Nancy L. "Document Delivery and On-Demand Publishing: Implications for Reference Service." *College and Research Libraries News,* 53 (September 1992): 510.

13. Woodsworth, Anne. "In the Midst of a Paradigm Shift: The Ownership Dilemma." *Library Issues.* 12 (March 1992): p.3.

14. Fullan, 1982. p.294.

15. Dougherty, Richard M. "Implementing the Vision." *Journal of Academic Librarianship.* 18 (July 1992): p.139.

16. Fullan, 1991. p.197.

17. Watkins, Beverly T. "Many Campuses Start Building Tomorrow's Electronic Library." *The Chronicle of Higher Education.* (September 2, 1992): A19.

18. Fullan, 1982. p.274.

19. House, Ernest R. *The Politics of Educational Innovation.* Berkeley, Calif.: McCutchan, 1974. p.171.

20. Altbach, Philip G. "The Information Revolution: From the Bottom Up." *Library Issues.* 12 (May 1991): p. 1 and 2.

21. House, pp. 73-74.

22. Line, Maurice B. "Conclusions and Comments." In *Libraries and Electronic Publishing: Promises and Challenges for the 90s,* 14th International Essen Symposium 14 October - 17 October 1991, edited by Ahmed H. Helal and Joachim W. Weiss. Essen University Library, Essen, 1992. p. 198.

23. Lortie, D. *Schoolteacher: A Sociological Study.* Chicago: University of Chicago Press, 1975. pp. 108 ff. Get

24. Fullan, 1982. p.292.

25. Fullan, 1982. p. 66/67.

26. Sarason. p.129.

27. Fullan, 1991. p.91.

27

# The Impact of the Virtual Library on Library Management and Organization

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# The Impact of the Virtual Library on Library Management and Organization

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## Abstract

**How will traditional methods of administration be affected by the new information technologies? What are the administrative issues in creating a "virtual" library in which scholars working at their desks have access through networks to a vast range of information resources? Managing the virtual library will present new challenges.**

**A recent survey conducted by the Association of Research Libraries in the United States, commissioned by the author, gauges the transitional progress of North American libraries. Highlights of the survey are related to the four broad interrelated areas essential to establishing and managing the virtual library: organizational structure, human resources, planning and evaluation, and funding and budgeting.**

# The Impact of the Virtual Library on Library Management and Organization

## Introduction

Exactly 500 years ago, on October 12, 1492, and it is a holiday in the United States, the globalization of the Old World and the New began. Whether you consider Columbus a great hero or a great villain, the world was changed by his voyage. Opening today in American theaters, a new film has a French actor playing the Italian sailor and an American actress as a Spanish queen. Such is the globalization of the film industry. Libraries with sophisticated systems and software, and growing telecommunications connections offer regional, state, national and international access; thus the globalization of library resources.

In 1980, A.J. Harley of the British Library defined the virtual library by drawing on an analogy from computing, specifically the concept of the virtual machine in which a large number of users work simultaneously at terminals and it seems to each as though they have sole access to a large and powerful computer.[1] Creating the "virtual library," in which scholars working at their desks have access through networks to a vast range of electronic information resources, will require that we address a number of complex and critical administrative issues in the next decade.

How will traditional methods of administration be affected by the new computer and telecommunications technologies? What are the administrative issues in creating a virtual library? In my paper, I'll cover three major areas: administrative issues for the virtual library; report on the progress of North American research libraries toward achieving elements of the virtual library and finally, present an opportunity for collaboration.

The virtual library, the library without walls, presents a new administrative challenge. The "real" library is much more predictable. Creating the virtual library will require just as much, if not more, manpower, and certainly broader and different skills. I will touch on four traditional interrelated areas of library management: organizational structure, human resources, planning and evaluation, and funding and budgeting, as related to establishing and administrating the virtual library.

## Organizational Structure Issues

New organizational structures will be needed if libraries are going to be successful in an electronic, networked environment--structures which allow for increased flexibility and innovation, and which are more responsive to change than present structures. Working relationships will be based more on a team approach with greater participation at all levels in the decision-making process. In a networked organization, information will flow more freely. Communication will be more direct and rapid, no longer location- or time-dependent. Is the "networked" organizational model an appropriate one for the virtual library?

A few libraries are redefining functions based on a new vision of the role of the library, described variously by those involved as the "library without walls" or the "virtual library." Research conducted by social scientists Lee Sproull and Sara Kiesler has shown that electronic network communications, in particular, have the potential to influence the overall work environment and the capabilities of employees, to foster new task structures and reporting relationships, to encourage broader participation and involve more people in the decision-making process, or at least in consultation.[2]

Key to this is making networking technology available to everyone in the organization and encouraging people to use it. Many libraries' online catalogs have a mail function for communicating with users. Other uses of e-mail involve reference, circulation, and acquisitions work. "As one looks to the external mail systems, it is apparent that more communication with other libraries, vendors, and colleagues is possible.... External mail systems are also being used to enlist the aid of colleagues to answer reference questions and to supply documents."[3]

By tapping into a wealth of knowledge and expertise, a kind of "virtual" working environment in which information and expertise can be shared, independent of location and time is created. New organizational structures cannot be created until there are new approaches to providing services. In general, we have not thought enough about how technology can transform the services we provide. At San Diego State University, the library has set up an electronic reserve book room. This is one example of a new approach to providing a traditional service.

Innovative ways of using technology to transform traditional services or develop new services may not result in a change in the actual structure of an organization but, rather, a change in how people work, both with coworkers and clients. The way we work will also be influenced by the increasing interrelatedness of library operations in an electronic, networked environment. Technical services staff and public services staff are already working more closely as a result of the implementation of integrated online systems.

Functional distinctions between library staff and computing center staff are also likely to blur.[4] Organizational changes may come about as the result of closer working relationships between the two units or through their merger.[5] Regardless of the model adopted, cooperation between computing services and academic libraries is essential. We need to strengthen and expand the relationships we have developed with academic computing and with academic disciplines.

Cooperative ventures in general will increase in the networked environment, with the potential to create "organizational superstructures" at the local, regional, and national levels. Forging new alliances and partnerships within the institution and with other institutions represents one of the greatest administrative challenges of creating the virtual library.

Fundamental to all of these new coalitions will be how decisions will be made and evaluated, priorities set, and services to various constituencies determined. A host of administrative, policy, technical, political, and philosophical issues will need attention. It is likely that institutions will be involved with more than one network or consortium, creating a web of administrative interrelationships. If we think establishing an EC, European community, is complex, imagine a global or virtual library.

## Human Resources Issues

It is clear that the virtual library will require new and increasingly sophisticated skills as librarians are required to work more closely with the emerging technologies on which the virtual library will be founded. For the virtual library to become a reality, computer and networking skills will have to be more generally distributed throughout the organization. It will no longer be sufficient to have on board a small group of technical experts. And it will not be enough to simply train people in a set of technical skills. We will also need to instill in the profession an attitude that embraces change and accepts challenges.

Where is the training ground for the virtual library? Graduates of such programs as Carnegie Mellon's masters degree program in information networking could compete for jobs in the virtual library with graduates from library schools offering a more traditional curriculum.[6] Or it may be that we will hire people who presently work in academic computing.

A better professional investment would be to incorporate into the curriculum of our library schools the skills and knowledge that the future generation of librarians will need to develop, manage, and operate the virtual library. A group of librarians, library administrators, and library educators intrigued by a discussion on the Library Administration electronic listserver concerning the role of the librarian and the library of the future have joined together as the Strategic Visions Discussion Group, sponsored by Georgetown University and with the support of the Council on Library Resources. Its goal is to develop a strategic vision that will move the profession, as a whole, in a direction that is more risk-taking, entrepreneurial, and pro-active.

The draft vision statement endorses the development of the virtual library, which it defines as "a concept of information housed electronically and deliverable without regard to its location or time".[7] It recommends that libraries experiment with new forms of organizational structure and staffing to enable the delivery of new types of services to users, "especially remote users, or users of the growing virtual library." In general, it advocates recognizing and supporting the concept of the library without walls, and "the capacity of library services to be provided in various environments."

As we move into the virtual library, we will still need staff with traditional skills. We will also need to prepare staff for the transition to the virtual library, which will require that they become both more computer and networking literate. Programs for retraining and, as the interrelatedness of library operations increases, cross-training, of existing staff will be needed. Ongoing training and staff development programs will be of critical importance and must be considered in our budgets. Central to the issue of staff development will be defining what we consider to be "basic training" for the virtual library.

It may be "easier to leave old structures in place so that traditional work can be continued by those who seemed to resist change, and to build new structures around these that would handle innovation.[8] Others believe that we need "to move from being pointers and retrievers to facilitators and organizers," shifting human resources from "the end of the stream, which helps the patrons find books, to the front line, which will organize information so that they can find it themselves."[9] Ken Dowlin, Director of the San Francisco Public Library, predicts that in the library of the 21st century there will be more investment in acquisition and organization of information than in service. Librarians may engage instead in developing the new systems and services of the virtual library such as gateways, user interfaces, search and retrieval systems, tools for navigating the networks, and document delivery systems. "Knowledge management" becomes a new role for the librarian, "a model for scientific and scholarly communication based on the idea that research librarians should share with faculty the responsibility for the collection, structuring, representation, dissemination, and use of knowledge, using computing and communications technologies."[10] We will need to find promotional ladders for new kinds of positions that did not exist before or that did not have a full range of promotional opportunities associated with them.

## Planning and Evaluation Issues

Effective, pro-active planning will be an essential part of developing the virtual library. Libraries will need to engage in strategic planning or direction setting which articulates the organization's mission, goals, objectives, and service roles in a networked environment, and which clearly lays out priorities. To be effective, such planning must take place within the context of the parent organization. We will also need to address in our planning efforts the integration of these new services into the traditional print library. Difficult decisions will have to be made concerning which traditional services and products we can stop providing so that we can begin offering new services and products that the virtual library will make possible.

A number of ARL libraries are engaged in various kinds of planning efforts that begin to articulate their vision of the research library of the future. Examples can be found in the strategic plans or visions of the University of Michigan, Indiana University, University of Alberta, and the Harvard College Library.[11]

As libraries change, new measures of performance will be needed that are valid and meaningful for gauging the success of the virtual library in terms of its utility and responsiveness to users' needs. Traditional performance measures for academic libraries have tended to focus on extensiveness, efficiency, effectiveness, and impact.[12] These will serve as a starting point, but in the networked environment, we must focus on developing effectiveness and impact measures. Most measures of library effectiveness are quantitative, based on size of collections, number of periodical subscriptions, etc. The success of the virtual library will have to be measured in terms of access rather than ownership. How will we measure access? Performance measures in an electronic, networked environment might include ease of use, downtime and response time of the network, turnaround time for document delivery, availability, accuracy, and usefulness of the information.

## Funding and Budgeting Issues

Financial resources far greater than those traditionally available will be needed to support the virtual library. According to Patricia Battin we must take into consideration three major categories: recurring and substantial capital investments in hardware; increasing operating costs; and a series of incremental costs associated with new hardware and software requirements and the salary requirements of a more highly skilled and diversified staff.[13] We will also have to identify alternate sources of funding. It may be that libraries will have to offer value-added services or charge for some services to recover costs. Fee-based services, which might, in a networked environment, be more attractive to clients, represent another possible source of revenue.

It is unlikely that we will find significant new sources of funding. Although libraries will engage in more development work and seek grant funding. Much of what will have to be done will be accomplished through reallocation of resources within the library or the campus. Can the campus support the technical infrastructure as a basic overhead expense like heat and lighting? Financial benefits may be realized, over the long term, by the pooling of resources through inter-institutional cooperative projects. In a networked environment, it will not be necessary to recreate and maintain databases locally. Such resources can be developed and shared among a number of institutions, as new partnerships are formed and the technology to connect and integrate shared electronic resources is put into place.

We will need to develop new ways of allocating our budgets. Complicating matters is the fact that for an extended period we will be supporting both a print/repository library and an electronic/networked library, which will further strain already taxed budgets. In the networked environment, access will become the primary function of the virtual library. To support access and delivery of information, money will have to be found from other sources or through internal reallocation. Added to this uncertain picture of costing out the virtual library is the economics of electronic publishing. Vendors and publishers are still developing pricing models for the electronic, networked environment, which could range from a pay-as-you-use to a flatfee structure based on user population, or a block-of-use purchase, or end user payment, perhaps by credit card.

## ARL Survey Results

How close are we to this "brave new world"? A survey of ARL directors shows good progress on several fronts (see Figure 1).

Based on the survey results a number of institutions are making notable commitments to electronic network service.[14] A smaller number of libraries indicated that they are involved in digitizing text for electronic storage retrieval or dissemination. Two indicated that this is being done on campus but not by the libraries. While much of this activity appears to relate to electronic document delivery, digitizing of text is also being done for preservation purposes. In the case of a few pioneering libraries such as those involved in publishing electronic journals, the digitizing of text is creating new opportunities and roles for libraries and librarians as generators and disseminators of information in electronic format. A few libraries are also experimenting with digitizing images. A larger number, a 66% of responding libraries, are providing access to electronic full-text, ranging from full-text files on separate commercial systems such as LEXIS/NEXIS to full-text files mounted on the local libraries online system.

Although training ranked high overall (86%) with respect to network information resources and tools, it appears to lag behind the technology. Almost all of the responding libraries (93%) indicated they are connected to the INTERNET but only 59% are training faculty and students in the use of INTERNET resources. A larger number (74%) reported that they are training users to conduct their own database searches an indication of the wide-spread development of online library catalogs, wide-spread use of CD-ROMs in libraries, and the introduction by commercial vendors of the user-friendly interfaces specifically for end user searching. We also asked if end users have access to files on or off campus, 88% of the libraries responding representing the second highest response rate in the survey said "yes" supporting a trend toward end user searching.

A number of libraries are developing online catalogs that provide access to a wide-range of information resources and services available from within the library and beyond. Eighty-one percent indicated that they include the holdings of other libraries such as the Center for Research Libraries and the National Agricultural Library in their online catalog records. Several libraries reported linking library catalogs within a state or region such as the Ohio Link Project and the PACLink project between Indiana and New York State libraries. The smaller number of libraries 72% provide or intent to provide a gateway from OPAC to external databases or networks.

Eighty-one percent of the responding libraries currently were involved in the planning and development of a campus-wide information system at their institution. Several libraries have established CD-ROM local area networks with dial in capabilities. Only 35% of the responding libraries indicated that they had a written plan stating access to information from a single workstation as their goal.

In the University of Alberta "Planning Document" the virtual library is described as demand driven rather than supply oriented. It is based on the specific information needs of its client not "speculative acquisition and warehousing of a broad range of resources", and its success depends on "assured and timely physical access to materials through enhanced interlibrary loan, embracing document delivery methods ranging from improved courier service to fax to electronic file transfer."[15]

Eighty percent of the libraries noted that they were developing or implementing policies, services or reallocations that emphasize access over ownership. Some libraries are purchasing at the request of users copies of articles from journals that the libraries does not own. One library reported that money used for this purpose was reallocated from serials cancellation project. Sixty-one percent are involved in the cooperative development or purchase of electronic files or hardware. Only a few of the many interesting developments and projects could be identified and incorporated in the survey summary.[16] A large number of ARL libraries are making reasonable progress toward the virtual library as defined by the survey. A smaller number are serving as pioneers in selected areas of development. While only an exceptional few are engaged in the majority of activities listed in the survey.

The ARL survey has proved to be an interesting baseline assessment of current activities and plans in North America. I would be interested in working with others in Europe to identify and describe the state of virtual library elements underway. As our continents, cultures, and interactions have grown closer over the last 500 years, it would be valuable to assess our present readiness to expand global library connections and resources. Therefore, I would like to informally talk with those of you who are here today who would be interested in seeing how to create such a research project internationally.

## Conclusion

We must ask ourselves what is it we can control and what we cannot control. We can control our own budgets, although that will be complex because of competing needs. We can control what systems and services we choose to invest in, and who we will collaborate with and on what projects. We need to try to influence, if not assist in, the development of pricing models of vendors and publishers developing electronic services and products. We must communicate to our administrators and faculty that this is a transition period. Developing and establishing the virtual library will not happen overnight. We must face the fact that technology will develop more quickly than funding or the institutional support we will need to establish the virtual library. We need better communication and understanding between chief academic officers and library directors.

In developing the virtual library, we must work closely not only with university administrators but with faculty as well. "Faculty attitudes will have a major impact on determining the nature and scope of future information environments in higher education... [Yet] there is still no consensus among most faculty as to what is an acceptable rate of change--or even that there is any need for change in the role of librarians and libraries."[17]

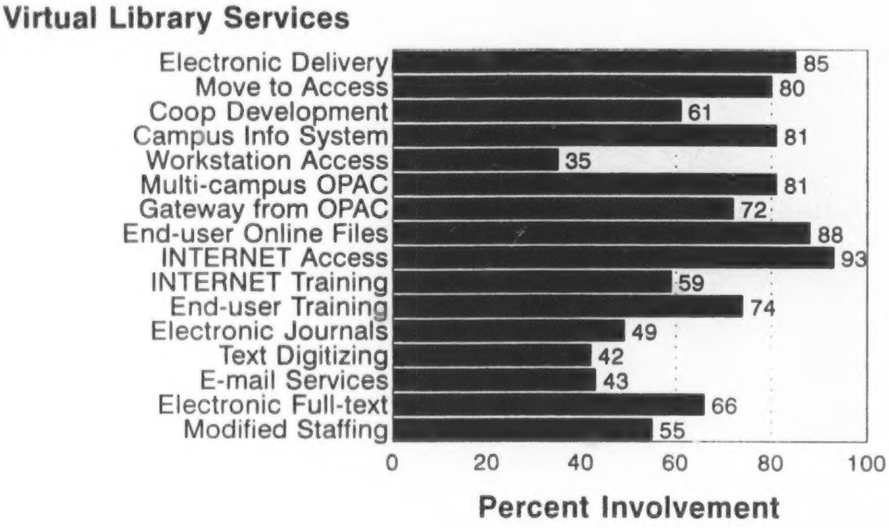
According to Paul Saffo, a research fellow at the Institute for the Future in Menlo Park, California, we are living in a "moment between two revolutions--one of print, not quite spent, and another of electronics, not quite underway." For librarians, this situation presents the twin challenge of trying "to maintain and sustain the paper medium, while at the same time exploring new, paperless media."[18]

A useful distinction between virtual reality and the virtual library was made by Lee Jaffe of the McHenry Library, University of California at Santa Cruz, as part of a discussion on the virtual library on PACS-L:

> The term "virtual" has been used in computing for quite a while and usually refers to a quality of apparency (i.e., that something appears to be something it is not as in virtual machine). Thus, virtual reality refers to the computer's ability to simulate reality, which has been applied visually and spatially. A virtual library... could cover any number of attempts to provide; wider library services via computer. A virtual reality library, on the other hand, would be an attempt at representing library services and resources through a visual and spatial interface.[19]

In this paper, I have used the phrase "the virtual library" generally in the same sense as Jaffe--essentially as a metaphor for the networked library. However, we should not dismiss or underestimate, virtual reality or the idea of the virtual reality library. The technologies of virtual reality may have applications in the library of the future, we cannot as yet foresee, applications that go beyond simply simulating the physical library.

# VIRTUAL LIBRARY SURVEY



**(Based on 74 Responses to Mailing of 109)**

FIGURE 1

## References

1. Harley, A.J. "Toward the Virtual Library." The Nationwide Provision and Use of Information: Aslib/IIS/LA Joint Conference Proceedings, pp. 163-166. London: Library Association, 1980.

2. Sproull, Lee and Sara Kiesler, Connections: New Ways of Working in the Networked Enviroment, Cambridge, Mass.: MIT Press, 1991.

3. Association of Research Libraries, Office of Management Services Spec Kit no. 149, "Electronic Mail," November-December, 1988.

4. Woodsworth, Anne, "Chief Information Officers, Academic Libraries, and the Information Job Family." A presentation at Computers in Libraries Conference, Washington, D.C., March 5, 1992 (to be published in Information Management and Organizational Change, Gary Pitkin, ed Meckler, fall 1992).

5. Martin, Marilyn J. "Academic Libraries and Computing Centers: Opportunities for Leadership," Library Administration & Management, vol. 6, no. 2 (Spring 1992), pp. 77-81.

6. Hills, Alex, "Teaching Information Networking," IEEE Spectrum, vol. 28, no. 10 (Oct. 1991), pp. 22-23.

7. Martin, Susan K., Jan. 1992, "Draft Vision Statement," Electronic Mail Posting, Public-Access Computer Systems Forum (PACS-L@UHUPVMI.Bitnet).

8. Lipow, Anne, "Reorganization in Reference Departments," Electronic Mail Posting, Public-Access Computer Systems Forum (PACS-L@QUHUPVMI.Bitnet), January 3, 1991.

9. Dowlin, Kenneth E., "Public Libraries in 2001," Information Technology and Libraries, vol. 10, no. 4 (December 1991), pp. 317-321.

10. Lucier, Richard, "Knowledge Management: Refining Roles in Scientific Communication," Educom Review, vol. 25, no. 3 (Fall 1990), pp. 21-27.

11. University of Michigan, School of Information and Library Studies, 1990-1991, Information and People: A Campus Dialogue on the Challenges of Electronic Information.

12. McClure, Charles, "Planning and Evaluation for the Networked Environment," EDUCOM Review, vol. 26, no. 3/4 (Fall/Winter 1991), pp. 34-37.

80

13. Battin, Patricia, "New Ways of Thinking About Financing Information Services," Organizing and Managing Information Resources on Campus, Brian L. Hawkins, ed. McKinney, Texas: Academic Computing, Inc., 1989, pp. 369-383.

14. Schiller, Nancy and von Wahlde, Barbara, "Toward a Realization of the Virtual Library, Part 1," ARL: A Bimonthly Newsletter of Research Library Issues and Actions, no. 163 (July 10, 1992) pp. 34.

15. Univ. of Alberta Library, Section IV, "Vision for the Future: The Networked Library, An Access/Resource Sharing Model, University of Alberta Library Draft Strategic Plan. 1990-1995.

16. Schiller, Nancy and von Wahlde, Barbara, "Toward a Realization of the Virtual Library, Part 2," ARL: A Bimonthly Newsletter of Research Library Issues and Actions, no. 164 (September 9, 1992) pp. 4-6.

17. Dougherty, Richard M. and Carol Hughes. Preferred Futures for Libraries: A Summary of Six Workshops with University Provosts and Library Directors. Mountain View, California: The Research Libraries Group, Inc., December 1991.

18. Saffo, Paul, "The Electronic Pinata-Information Technologies and the Future of the Library," Keynote address for the Sixth National Conference of the Association of College and Research Libraries, April 12, 1992, Salt Lake City, Utah.

19. Jaffe, Lee, "Virtual Libraries," Electronic Mail Posting, Public-Access Computer Systems Forum (PACS-L@UHUPVMI.Bitnet), January 2, 1992.

# The New Campus Information Environment

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# The New Campus Information Environment

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## Abstract

**There is general agreement that academic libraries are struggling to absorb new technologies during a time of budget constraint. There is growing uncertainty as to what might be the role of the academic library in a networked information environment. This presentation looks at the question of what does the library need to be from the perspectives of different stakeholder groups, i.e., faculty, academic administrators, chief information officers, librarians, and network developers. The perspectives are different, but all portend great change. The challenge for librarians is to create a climate in which programs of planned change can occur.**

# The New Campus Information Environment

We librarians believe that the resources of university libraries represent an important asset to our universities. They contribute to the overall quality of higher education in our respective countries. Historically, university collections were built to serve the needs of current and future students and scholarly researchers. And today the quality of our libraries is judged by the size and breadth of collections.

University libraries in most western nations experienced a long period of growth that represented a period of unparalleled library prosperity. It is also true that this rapid and sustained growth also produced its share of challenges: collections becoming more expensive to organize, house, and preserve, and for many users more difficult to access and use.

It is also unfortunately true that the academic culture relegated librarians--from my viewpoint--into the category of collectors and preservers of the scholarly record rather than seeing them as active participants in the research and teaching enterprise. Many scholars do not view librarians as being part of the mainstream of campus intellectual life. This lack of centrality has and will continue to vex librarians. Moreover, librarians alone can't change the image others have of them, but librarians can change what they do and how they contribute. And, if changes actually occur, it is possible over time that the attitudes toward librarians and the roles they play may also change.

## Changing Campus Environment

We university librarians have already entered a new era. Information technologies are prompting new services, roles, and relationships. The concept of the virtual library, i.e., a library that provides access to electronic and print materials from many sources, both local and remote, has achieved a widespread popularity. However, we are also a long way from fulfilling the vision of a virtual library. Moreover, the changes that must occur before research libraries can fully exploit the new information technologies are enormously complex and expensive; and furthermore, the necessary changes must be implemented in multi-institutional environments that are bureaucratic and resistant to change.

Librarians are only one of many groups that have a stake in how the world of information is transformed. For example, libraries and computing centers, with different organizational histories, different staff expertise, and different funding structures, now find themselves charged with providing information support that neither of them can fill well. The domains of faculty, publishers, vendors, academic administrators, and computing officers have become very much intertwined. We have in fact become interdependent. We no longer can chart our course independent of other groups.

Universities themselves are facing grim financial realities, and many officials believe that their institutions have entered a long-term period of tightly constrained economic resources. The need for campuses to invest in diverse electronic formats and the equipment necessary to use them has come at the very time costs of traditional library materials are rising at unprecedented rates. The critical question is: How can universities, libraries, and computing centers respond to create new and more effective information environments in this tightly constrained environment?

Most librarians recognize the need to reevaluate the traditional model of self-sufficiency through centralized collections for which libraries serve primarily as caretakers and organizers. One oft-heard preference is for librarians to adopt new roles that include the provision of customized information services as well as access to remote resources in many formats. Such roles, no matter how desired, will be achieved, if at all, only through collaborative efforts with other groups.

We librarians are quite familiar with the often-heard exhortation that we become more collaborative with other university libraries. Collaboration is viewed by academic officials as an important channel for meeting the rapidly growing demands for information resources. In fact, great strides have been made in developing national collaborative programs in areas such as preservation and bibliographic description. However, in the U.S. at least, no models producing fundamental change in the way local collections are developed or in how resources are shared among research institutions have yet materialized.

In Great Britain a strong argument can be made that the existence of the BLLD altered the pattern of collection development in that country. But in the States, collection self-sufficiency is still the dominant operational philosophy of most research universities, even in the face of already severe and mounting financial constraints. Even with the increasing power of technology to improve access to and delivery of information and documents, when push comes to shove, faculty want materials located on their campuses. They don't want to be dependent on distant libraries for needed materials. Many of them also, because of the structure of their disciplines, still depend on at-the-shelf browsing. Often efforts by librarians to de-emphasize collection ownership are interpreted as a failure to understand both the political environment and legitimate differences in research methodologies among disciplines.

The decade of the nineties will be characterized as the early stages of the transition from the physical library to the virtual library. This transition will affect everyone from undergraduates to senior faculty. It will affect the way teaching and research are conducted. The nature and extent of change on individual campuses, however, will reflect local missions, traditions, fund availability, and attitudes among faculty, administrators and library staff.

## Preferred Library Futures

Today there is no consensus as to what the future holds for research libraries. There is, however, general agreement that technology will play a profound role, but the specifics remain much less clear. As I mentioned earlier, we do know that the world of information consists of many distinct but interdependent stakeholder groups.

Last year at this symposium I reported briefly on the results of a series of workshops that brought groups of university provosts and librarians together. The objective of those workshops was to enable campus officers to identify what were their preferred library futures. We didn't ask them to predict the future but to simply identify what futures they preferred for their libraries. The most commonly cited image was the "universal workstation networked environment." This concept encompasses "seamless" or "transparent" access by faculty and students to a variety of information resources from multi-functional workstations. In fact, the workstation environment was expressed in a variety of ways:

- an integrated library/computer facility which is transparent to the user;
- comprehensive access to national databases in all formats;

- information "virtually" accessible in one place;
- workstations for everyone for of the information needed;
- a universal terminal that can handle multi-media in all formats;
- workstation access to all media--in many locations;
- universal access to databases, regardless of user and resource location.

While the universal workstation environment was the favored image, participants weren't sanguine that such an environment would quickly materialize. In fact, they identified several formidable obstacles, for example, costs of creating and then maintaining a technologically-oriented information environment coupled with angst over the myth that technology will "solve" our problems.

It was also clear that librarians are fearful that officials may possess over-simplified views about the future library, such as a library without books. Overall, even with reservations such as the one just cited, there seemed to be little disagreement that the universal workstation in a networked environment was the preferred future of most who attended the six workshops.

With the benefit of reflection, we can identify some important themes that emerged from the workshops. Participants felt strongly that leaders who were willing to assume risks had to be found. Who should step forward and why one would be willing to assume such risks are questions still awaiting answers.

We as information professionals don't know how to transform our organizations, or one might paraphrase the dilemma: we don't know how to get there from here. We can articulate visions, but we don't know how to implement them. For example, who is going to pay the bill? Or who is going to pay the bill as libraries and computing systems operate parallel systems?

A key question is: What next? Are we going to sit where we are, spinning our visions and our organizational wheels, or are we going to act? What strategies will we pursue? It was this concern that triggered a subsequent workshop that brought together representatives from the ranks of publishers, university administrators, information technology managers, faculty, library directors and consortia/foundation directors.[1]

## Charting New Paths

This group discussed what an effective campus information environment must be like in the future and what strategies might be pursued in order to transform current campus information environments. Unlike its predecessor, "Preferred Futures for Libraries,"[2] this project focused on what participants considered to be absolutely essential rather than what they might prefer. Although the opinions expressed cannot be considered representative of an entire stakeholder group, and the workshop was not designed to be a research project, the views expressed provide numerous insights into where commonality does and does not exist among stakeholders.

This workshop was designed to provide opportunities for a diverse group of key stakeholders to identify what steps leaders within organizations could take to move a campus information agenda forward. To our knowledge, this was the first time that such a diverse group had come together to address common concerns.

The meeting was organized in order to set the stage for exploring the following question: "Given your stakeholder perspective, what does an effective research library *need* to be like -- *need* to be doing in the year 2000?"[3]

Participants were asked to brainstorm in terms of specific roles, responsibilities, services, user expectations and demands that need to be filled. The intent in asking different groups to identify what they considered to be essential tasks for the research library was to illuminate areas of agreement and disagreement that will have to be taken into consideration as campuses plan for the future.

The groups were divided into a series of stakeholder groups, i.e., faculty, publishers, librarians, academic officers, etc.

Each group developed a profile of what research libraries and librarians needed to be doing. A capsulated version of what the publisher representatives thought the library ought to become will serve as an example:

- Libraries must not be warehouses but must provide access;
- they need to be more effective at cooperating with other institutions;
- they need to have a perspective that embraces all information formats;

- they need to be more selective in what they buy and in the services they provide;
- they need to be better marketers;
- they need to be more willing to offer some services free while charging for others;
- they need to be more active as intermediaries between users and information providers and scholars and information resources.

They also felt that campuses require a campus information system (cis), and campus information systems require a larger share of the campus budget; librarians need to be more actively involved in allocating campus information resources; librarians need to lead in university environments.

Without delving into the details I can report that the stakeholder groups viewed quite differently the world of information and what a library needs to be in order to remain a vital contributor. In fact, as one assimilates how differently the various stakeholder groups feel about the issues impinging on libraries, it becomes very easy to understand why there are so often disagreements about various issues.

Groups were asked to consider possible courses of action that might be initiated or pilot projects that could be undertaken to ensure that essential roles and responsibilities can be met. The approaches suggested ranged from a one-year moratorium on all library acquisition purchases with the funds being used to create a new campus information infrastructure to tracking "funny money" expenditures to identify exactly how various constituencies acquire information.

The participants were next organized into a series of "mini-think tanks." The think tanks were structured so that each group could explore further one of the ideas that had been raised earlier in the meeting. Each group was asked to address six questions. These were: What will the idea look like when in place? Who are the key stakeholders or players? What are the primary benefits, and to whom? What are the potential obstacles? What data needs to be collected? What specific evidence would indicate progress?

The constraints of time prohibited groups from refining their ideas for pilot projects, but the limited time did not prohibit them from meeting the objectives for the day. As an experimental exercise in collaborative thinking, the process worked well.

Two of the think tank discussions will provide readers with a flavor of what took place.

**1. Create network access through personal workstations:** This group planned an environment whereby students and faculty would have access to networks through personal workstations. It was recognized that significant institutional investment would be required; therefore, top administrators must first be convinced of the benefits of such investments. Such benefits would include more productive faculty, higher quality research, enhanced teaching, and--by bringing information electronically into the classroom--improved faculty communication.

A variety of concerns were also raised. There was a fear that universities wouldn't act and consequently would be left out. It was important to remember that national and international networks are developing rapidly independent of what academic institutions are doing; and publishers are preparing to deliver content once the infrastructure is in place. Furthermore, government agencies and individuals are increasingly making information available in electronic formats.

The group reasoned that a new environment can be brought about by establishing pilot projects that will identify and quantify benefits. Pilots should employ tools, resources and develop linkages that will move an institution's agenda forward.

The most important point raised by the group, in the author's opinion, was their recognition that high level administrators must first be convinced that the necessary resource investments are worthwhile. This aspect was viewed to be the “key“ consideration by the group.

**2. Crop rotation model:** The most startling idea generated recommended that, for one year, 90% of the library's normal materials budget be used to develop a new library/campus infrastructure, e.g., to wire campus offices, dorm rooms and libraries and connect them to existing networks. The remaining 10% would be turned over to academic departments so that specific and identifiable needs could be dealt with. A novel idea dubbed “crop rotation“ was proposed whereby the fund diversion process would be rotated from institution to institution so that no one institution would bear the sole burden of such dramatic action. The group developed ways in which publishers and vendors might be drawn into the project as collaborators. In fact, some of the suggestions were offered by one of the vendors in attendance.

And what about the library, what would the staff be asked to do during the year? Among the suggestions were that the library experiment with full-text document delivery serving as a campus node for all available electronic full-text documents; they might also develop new capabilities for pointing users to information located beyond the physical limits of the campus. Some library staff would be retrained and special efforts would be made to eliminate existing cataloging backlogs. Library staff would also conduct a market research study to learn how the 10% of the budget which had been turned over to departments was actually spent and to identify what fundamental needs remained unmet.

The group knew their proposal would generate comments and they were not disappointed. The feedback was candid:

- "It's a bad idea because it ignores faculty and student needs for one year."
- "A campus is a human service organization, not a factory that can be shutdown for retooling."
- "What about cross-disciplinary acquisitions? Do they fall through the cracks?"

This group too recommended that a series of pilot projects be designed to permit a multi-year transition period which would ameliorate the magnitude of the immediate operational impact. And the group also recognized that just about all of the information stakeholder groups would be impacted, and, that before an institution would likely assume the incumbent risks, the direct involvement, or at least moral support, of groups such as the AAP, ARL, CRL, AAUP, RLG, AAU, OCLC, CNI and the Commission for Preservation and Access was essential. This upheaval approach reflects the "big bang" theory of change.[4]

## Issues Outstanding

During the workshop several themes and concerns frequently emerged: the extent to which the various stakeholder groups are interdependent; the need for monitored pilot projects to demonstrate the efficacy of the new technologies; the importance of learning how to collaborate more effectively; the need for seed money to support innovation; and the need to create more hospitable climates for risk-taking.

**Stakeholder interdependency:** There is considerable overlap in interests among the stakeholder groups. In some cases there is intergroup agreement, but in others group interests are in conflict. This condition presents a variety of organizational issues to be sorted out: Who does what? How will the roles of various organizations be changed? What can be done to avoid win-lose perceptions?

There are more issues than many realize on which agreement exists or where agreement could be negotiated, but there is very little opportunity for the key stakeholder groups to talk or work together for a sustained period of time. The Coalition for Networked Information (CNI) has stimulated inter-stakeholder dialogue and projects primarily between librarians and computing officials, but, for the most part, the various stakeholder groups continue to pursue their own interests independently. This pattern must be altered if collaboration is to take root.

**Pilot projects:** The need to mount pilot projects in order to establish the credibility and demonstrate the value and practicality of new information provision strategies was clearly understood. There has been much talk about the virtual library drawing on electronic data made available through a series of electronic networks, but no one has demonstrated what can be done now or what needs to be developed in order to achieve the vision of a virtual library environment. We need to take the initial steps. We need to walk before we run.

**Collaboration:** In the traditional competitive environment of higher education, the nature of intra- and inter-institutional collaboration is not well understood. It has been traditionally assumed that libraries “ought“ to work together--and they have done so to good advantage in many instances. However, results are often viewed as peripheral to both the library's and the university's primary objectives. Campus officials need to be more realistic about what can and cannot be achieved through collaboration. As one of the groups pointed out:

> “No university official is going to put his/her institution at a disadvantage in a competitive situation. Does anyone seriously believe that a major university would voluntarily and unilaterally stop buying library materials while competing institutions continued operations as normal?“

Since a networked environment will require significant collaboration among all producers and users of information, the existing barriers to success must be removed.

The real or perceived competition to determine which campus has the biggest library must be downplayed as a factor in the game of inter-institutional collaboration. In fact, the entire campus information environment should be removed from the competitive arena if anything remotely approaching a paradigm shift is to be accomplished.

**Risk-taking:** No conversation about achieving the vision of a new information future is complete without a discussion on the need for more risk-taking. The participants were certainly in agreement that there is a need for more risk-takers in leadership positions. However, participants were reminded that if campus officials want to stimulate more risk-taking, they must be prepared to reward the risk-takers, even if the risks taken don't pan out.

Developing innovative information systems will require increased collaboration and communication skills, yet effectiveness at collaboration is rarely factored into campus reward systems. More librarians have been criticized for extending the hand of cooperation than have been lauded for their altruism.

In an environment in which there are conflicting and ambiguous goals, it may be difficult to come to an agreement about what is risk-taking, which risks are most important to take and which risk-takers are going to be rewarded. But it is necessary that campuses establish which goals are worthy of taking risks and, even more important in the author's opinion, campuses must be willing to protect the work of transforming campus information environments from the day-to-day competition that one finds so common at a typical university. Competition will only serve to inhibit risk-taking.

**Resource availability:** There was a general feeling that seed money will be needed to fund pilot projects. A zero-sum philosophy in a complex organizational setting will only impede innovation because there is always a reluctance to test unproved alternatives if tried and true activities must be jettisoned as a consequence. Innovation in a zero-sum environment only invites turf battles and user opposition. Officials need to be willing to prime the pump.

At the same time, the participants clearly recognized that it will be necessary to rethink how campus information activities are funded. There was a general feeling that money to both prime the pump of innovation and reallocate existing resources will be needed in order to create a new campus information environment.

## Next Steps

Based on what was learned, what might be useful next steps? This workshop provided the first organized opportunity for representatives of so many stakeholder groups to talk about issues and to listen to the views of others. Many of the solutions suggested during the workshop will remain beyond reach until ways are found to implement multi-stakeholder problem-solving strategies. What seems so obvious and yet remains elusive is an inter-stakeholder communications capacity that enables interested parties to examine issues, consider alternatives, and propose workable strategies.

Almost without exception, when experts view the future, they stress this need for inter-group collaboration. For example, Steven W. Gilbert of EDUCOM, in writing about changes that may be required to update copyright legislation in a technological environment, emphasizes the need for collaboration. He states "Our first task is to articulate the issues with sufficient clarity to permit the development of effective strategies involving collaboration of all interested sectors."[5] This same emphasis is clearly evidenced in the recommendations of a report authored by the Panel on Information Technology and the Conduct of Research. The authors spell out in some detail the roles that various sectors must play "to help researchers use information technology more widely and productively."[6]

It is the author's view that a significant first step would be to create a capacity using the telecommunications technologies that would facilitate more inter-stakeholder communication. If the parties were able to take fuller advantage of the electronic communication tools already available, this goal could be achieved. We believe it is possible to create an entirely new electronic supported communications/meeting environment wherein interchanges and discourse do occur.

Above all there is a need to mount pilot projects that will test and demonstrate various capabilities of the new technologies. The pilots will have to take into account the current constraints of the academic culture, provide necessary incentives and rewards for risk-taking, recognize the differences among disciplines in information gathering habits of researchers, build alliances where competition and mistrust now prevail, and be especially sensitive to how a new information environment will affect those who manage today's information organizations and on whom universities must depend to create the new campus information environments. A tall order even for the "best and brightest."

It is important that while aspirations may soar, expectations must be kept realistic. It is our judgment that expectations of speed should not be too great. We believe that progress will be slow for a variety of reasons: the intractability of campus cultures, the complexity of managing multi-institutional pilots, and of course existing funding constraints. As Penrod and Dolence have expressed the situation,

> A commitment to true transformation will require institutional analysis far more critical than that required by an accreditation visit, resource redistribution more extended than any caused by fiscal crisis, and broad-based restructuring beyond any resulting from a systems merger.[7]

Nonetheless, let us keep firmly in mind, if higher education is to play a central role in our nations' evolving information societies, then it must begin soon to reorder its priorities and release its impressive reservoir of human and material resources.

## References

1. Richard M. Dougherty and Carol Hughes, "Charting new campus information environments: Preferred library futures II ." To be published by Research Libraries Group, Inc., Mountain View, CA.
2. Richard M. Dougherty and Carol Hughes, "Preferred futures of libraries: A summary of six workshops with university provosts and library directors ." Mountain View, CA: Research Libraries Group, Inc., 1991.
3. The term "research library" was used as a convenience, since we lack a single term that describes all that a traditional research library represents plus the other elements of a campus information environment. We also employed the phrase "campus information environment" to describe all aspects of a campus' information infrastructure. This would include school and college computing and libraries, in addition to the campus-wide library system, campus computing facilities, and telecommunications units.
4. Thomas W. West, "Library leadership in a '4D' environment." Paper presented at INFORMA 1992, Hilton Head, SC, May 12, 1992. p. 12.

5. Steven W. Gilbert, "Information technology, intellectual property, and education." EDUCOM Review, Spring 1990, p. 14-18.

6. Information technology and the conduct of research; the user's view; report of the Panel on Information Technology and the Conduct of Research, Sponsored by National Academy of Sciences, National Academy of Engineerin, Institute of Medicine, Committee on Science, Engineering, and Public Policy. Washington, D. C.: National Academy Press, 1989, p. 3-4.

7. James I. Penrod and Michael G. Dolence. Reengineering: a process for transforming higher education. Boulder, CO: CAUSE, 1992. p. 19.

# Electronically Recorded Information and the Library

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# Electronically Recorded Information and the Library

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## Abstract

**Electronically recorded material presents a challenge to librarians in selection, evaluation, organization and retrieval and will necessitate the creation of clearly defined guidelines for selection, criteria of evaluation, systems of organization and retrieval. This is necessary not only for the contemporary researcher in need of information, but also as the material that will serve scientists in the future wishing to explore their past. We have mastered the use of written materials, now we shall have to devise the means to accomplish the same with non-print materials.**

# Electronically Recorded Information and the Library

Electronically recorded information presents a new kind of challenge to librarians and will, I think, force them to expand their fields of activity beyond the boundaries existing today. While electronics and computers have ousted the venerable card catalogue, and in many libraries of today it now stands forlorn, a mastodon left from the past, carrying bright notices recommending "The card catalogue is incomplete, please consult the computerized system" or words to that effect. CD-ROMs and video-discs and other miraculous inventions that store pictorial, audial and written information with equal ease have offered librarians a technology that enables them to access novel sources of knowledge: films, videorecordings, educational computer programs, music and entertainment, in endless profusion.

Information is being recorded in such a variety of electronic ways, that non-print recorded knowledge may soon represent a major part of material that the library must organize and retrieve. As in all abundance, there is a built-in difficulty in coping with multiple systems of recording and the organization of efficient retrieval.

Man creates technology, but is also shaped by it: in a world where audio-visual sources of information are preponderant and preferred over print forms in both educational and cultural frameworks, the ability to FIND electronically recorded items of information lags behind the ability to CREATE non-print forms of information. Electronical recording devices, with their ability to record text as well as sound and images, also offer the technological means of retrieving such information, and what seems to be a problem at this point is a fundamental change in the approach to indexing informational items.

As a teacher in the field of communications, I am constantly looking for suitable recordings to illustrate some points with audio-visually pertinent examples. I spend a lot of time viewing films, and usually remember seeing something apt while looking for something else. It is a rare case indeed when I manage to recollect where I saw that sequence, and how to find it again. There are practically no tools available to me as a user to retrieve some specific items of information.

Is a baby giraffe born head first or feet first? When and where was the birth of a kangoroo filmed, showing the tiny creature making its long and arduous way into its mother's pouch? Have others than Warhol used cans of Cambell's soups in their paintings? Have the movements of a horse's feet in dressage ever been recorded? How many different recordings of Bach's Goldberg Variations exist? In what way are they different? The list of possible items of information is practically endless. The answers are not to be found in texts: the birth of a baby kangoroo is on film; there are probably millions of slides depicting modern art objects, among them a few having soup cans as their theme; the world of sports is increasingly recorded on film and video. More and more people own video cameras and use them to record scenes, that start historically momentous events: assassinations, revolutions and police brutality. Videotapes which changed society have been recorded by non-professional photographers with a handy video camera. Pictures and sounds can, it seems, create not only sympathy for suffering people but also anger that causes suffering.

There are two levels of abstraction with which this problem can be tackled. One basic concept of organized knowledge is its organization in such a way as to make particular items available with reasonable speed and accuracy, and the second is to make separate stages of a process available on the basis of various sources, both print and non-print. While books and periodicals have indexes that as a last resource can be combed for informational items slowly and awkwardly, there are as yet few ways of accessing information in films and videorecordings, or in footage of film prepared for TV news and not included in the finished reportage for example.

Yesterday's historian pored over archival material and private correspondence, documents and treatises, community and church records in the quest for a true interpretation of an event. Tomorrow's analysis will have to be made on the basis of inexhaustible non-print material. Will scientific advances always be described verbally, in a written form or will videorecordings take the place of verbal description, as has already happened in surgery, for example. Should a medical school provide aspiring surgeons with a frame-by-frame analysis of a complicated process or a written manual? Can anthropologists and archaeologists share their filmed and photographed sources with their colleagues and thus give access to recorded information that is of inestimable importance to another researcher? Can anybody know who has filmed the use of magic in urban societies, except if such a subject is identifiable from the title of a film or a TV program? Despite the accuracy and comprehensiveness of scientific abstracting and bibliographic information, do we have equal access to print and non-print forms? Should we have equal access? Perhaps we should have better access to non-print information because it may be less interpretative and more factual? Is non-print material really more objective and scientifically unambiguous?

Electronically recorded information is of several types: there are descriptive items, illustrations and processes; there are discrete, short items and complicated sequences and procedures. Artistic films are often composed of a narrative fragmented by flashbacks and other extraneous pieces. Still, art films have the same kind of information that fictionalized written accounts contain. Can their philosophy be indexed in the way a novelist's world view can be made available to the seeker of information? Can educational goals be pursued only on the basis of educationally conceptualized and prepared materials? Can non-print material be used directly by the library patron or must it be interpreted by a scientist, a professional librarian or an expert in communications?

All this raises the problem of the present and future role of the librarians: organization of knowledge is becoming a much more complex task than ever before not only quantitatively, but also qualitatively. What must a librarian know in order to make a correct evaluation of non-print materials, their informational value and scientific significance? In print materials, it was sufficient to be able to classify an item correctly, even if its portent was not fully understood: a person with a somewhat superficial acquaintance with biological and bacteriological terminology could retrieve scientifically valuable information for scientists. Can the present education of librarians train them to do the same for non-print material? How much biology does a librarian need to classify CT printouts or medical records obtained by optical fibre? Should librarians be trained in techniques of computer stored medical information retrieval? Should electronically recorded fiction be subject indexed or is it enough to know who wrote the script, made the film, who played the leading roles and who directed it? For that kind of information, there are many directories in book form available today, but if we wish to investigate the problem of old age and acceptance of it, would the film “On the golden pond“ with Henry Fonda and Katherine Hepburn, which deals with one aspect of aging, appear on the computer screen along with scientific material on gerontology and geriatrics? There are many films, some good, some bad and some indifferent that deal, one way or another, with old age. Should a seeker of information on old age be given an artistic film interpretation in addition to more usual research materials? All these are perplexities that I think we must face sooner or later, and the later, the more difficult it will be, as material will have to be indexed and analyzed retrospectively as well as currently.

It seems to me that handling non-print material will necessitate a fundamental change not only in the approach to classification and information retrieval but also to library education.

Technological advances bring in their wake the need for technological know-how and, undoubtedly, librarians of today and of tomorrow must be capable of using the new technologies in the best way. What seems to be happening, with the introduction of on-line computer searching and the use of CD-ROM materials, is that librarians spend time teaching patrons use on-line catalogues and CD-ROMs, and some time will elapse before most library users will retrieve information efficiently with this technology. However, just using the technology is not enough: it must be possible to make an exhaustive and sophisticated search for information for research and teaching, and this depends not only on the skill to hit the right key, but first and foremost on the creation of a system of indexing that will enable a beginner do efficiently a sophisticated search. Elementary, my dear Watson! The plot thickens when the librarian must evaluate non-print information. There is a deep seated belief that "if it's written, it must be true". Scientists and librarians, trained to be more sceptical than the general public, make more sophisticated evaluations. But when we deal with electronically generated material, we are facing at least three levels of veracity of the record:

1) We may have an on-the-spot record of an event, taken at the time of the occurrence: the birth of a baby giraffe, the assassination of a president, the beating of a truck driver, the fertilization of an egg. These are perhaps the best, most objective records, excellent when they are the culmination of a carefully and scientifically controlled event. They can be controversial and open to interpretation if taken in the heat of the moment, from an awkward angle by a photographer flustered, excited and perhaps jostled by an angry crowd.

2) We may be seeing a carefully reconstructed chain of events, created partly on the basis of verbal descriptions, recollections of the central characters and an independent search for a true interpretation.

Reconstructions of crimes by the police, of social events by anthropologists and recordings of music belong to this category. It is not the live recording of an event but a painstaking recreation, controlled for sound and picture, depicted from the best angle and with multiple takes, edited for veracity and accuracy. It can also be a subtle distortion according to some pre-determined point of view, not even noticed by the maker of the film, but apparent to some viewers.

3) We may be presented with a dramatized version of events. Even though we may be warned that the events depicted are a dramatization, we still tend to consider the record truthful and accurate. It is only by careful analysis and criticism that we may be able to disentangle truth from drama, facts from fantasy and straight account from more or less subtle distortion.

We therefore must train librarians in the correct evaluation of a non-print record. Moreover, past events have demonstrated that non-print material from private sources, made by private individuals may contain exceedingly important information. If in past periods we base some of our reconstructions of truth on personal correspondence and old faded photographs, tomorrow's historian, archaeologist and social scientist will also use our private videorecordings in the same manner. Are today's libraries capable of collecting, storing and organizing material for future use? Those who study today western culture of the sixties are bemoaning the fact that very few basic material objects of popular culture have remained, mostly outside of library collections who did not quite know what to do with the buttons from past political campaigns, the underground newspapers of the campuses, and the first literary offerings of today's established poets. The libraries of today may make the same mistake regarding non-print materials from both public and private sources. Unless well known figures from politics made a practice of donating their private papers and correspondences to libraries established for that purpose, can tomorrow's historian reconstruct today's momentous events? This is one example of a transformation of private non-print sources into public ones. Dealing with non-print archival material presents a technical and professional challenge, and I hope that librarians will meet that challenge.

However, where quantity reigns, quality must be closely controlled. Indiscriminate collection of materials will result in an impossible task of organization and retrieval. Thus, librarians must select and for selection one needs clearly formulated, viable guidelines. How and by whom will these guidelines be created? Upon whose authority will one item be retained and others, perhaps of equal importance be doomed to oblivion? The specter of selection versus censorship seems to rear its ugly head. Do we collect what is fashionable today or do we concentrate on that which is not in the mainstream of thought? Some of this and some of that? All points of view regardless of ideology and doctrine? Just those items that make us look good in our own eyes, and therefore presumably will make us so in the eyes of future observers?

Most of the foregoing seems to be questions, and I am afraid that at this point I have only very few answers. The attempt made to index anthropological literature and sources resulted in the Human Relations Area File (HRAF), an ambitious project that was to help researchers compare social and cultural data and find minute details in the vast ethnographical literature. It took many years of concentrated effort and could probably have been much easier to accomplish had new CD-ROM and other technologies existed at the time. Can we create the equivalent of the HRAF for non-print materials in a certain field? If the comparison of written data is difficult, how complicated will it be to compare data recorded through different techniques, on different scales of size and on the basis of separate sets of criteria?

Obviously, some or most of the above problems will be solved eventually, and those that will not, will probably not be important anyway. What needs to be done at this point, is to conceptualize clearly what are the implications of non-print materials and their accompanying technologies for librarians, users and libraries. For a long time we have been concerned with the development of new technological tools but have thought less of what to do with them. It maybe the right time for trying to decide the uses we wish to make of them. The jinn is out of its bottle and is puffing itself to a great height: what shall we command it to do?

## References

Daily, J. E.: Organizing non-print materials. 2. ed. New York, N.Y. Marcel Dekker, 1986

Fothergill, R. and I. Butchart: Non-book materials in libraries - a practial guide. London, White Bingley, 1990.

Hoffmann, F. W. Popular Culture and Libraries. Hamden, Conu., Shoe String Press, 1984.

# Management Development in the Networked Library

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## Abstract

Information technology has transformed library and information services. Distinctive features of the electronic library include the shift towards self-service modes of delivery, with distributed access to networked resources, and a focus on the end user and tailored provision to meet particular client needs. Implicit in this model is a switch from print-based materials to new multimedia sources. The role of information specialists is changing from searcher/information provider to facilitator, adviser or consultant in information management. User education trends reflect these developments with the integration of information skills instruction into the teaching/learning process associated with project work and specific assignments.

The impact of the convergence of computing and telecommunications technologies extends beyond information systems and service strategies. New patterns of service require new styles of provision, necessitating new imperatives for staff development and training, as well as a review of organizational structures that may no longer be relevant. Management styles are changing alongside service developments, typically featuring flatter, more flexible structures; wider participation in policy-making and decision-taking; the use of task forces to review and develop services; devolved financial responsibility and improved planning and performance measurement. Total Quality Management is a philosophy ideally suited to the library of the future.

# Management Development in the Networked Library

## Introduction

In choosing the title for my paper, I have deliberately used the phrase "networked" library rather than the more popular "electronic" library, both to remind us that libraries - even in their futuristic self-service mode - are essentially about people, and to focus our thoughts on the human aspects of management. The pace of change, significantly driven by technological developments, has tended to concentrate attention on technical advances; human resource issues have not been entirely overlooked, but they have too often been treated as an afterthought. There is a real danger that many academic and other types of libraries will wake up to this fact so late that they will face a continuing uphill struggle to redress the balance. The opportunity is here to ensure that we not only realize the full benefits of the electronic campus, but also enjoy the process.

This paper will touch on several related themes - staff development, management structures and styles, and strategic leadership - but will begin with a quick survey of environmental influences to set the context for subsequent discussion. More significantly, I want to highlight some underlying issues: the need to put people first, as already indicated; the need, also, to close the yawning gap between aspiration and achievement; and in addition, the need to consider the holistic nature of management and to recognize that it is not only our services and operations which are interdependent - none of the topics mentioned can be treated in isolation.

## Setting the Scene

The *environmental factors* currently having an impact on libraries are well known and have been fully documented elsewhere. In the United Kingdom they include: constrained or reduced budgets, particularly brought about by substantial cuts in public expenditure; escalating costs of library materials, with book and periodical prices rising at a level well above that of general inflation; significant growth in the supply of and demand for information, exacerbated by the advent of new media and electronic publishing; convergence of computing and telecommunications technologies, widening the options for service delivery and blurring the roles of libraries and computer centres within organizations; promotion of the concept of tradeable information, accompanied by the creation of a sizeable private sector information broking industry; emphasis on accountability and value for money; focus on quality and customer care. In the higher education sector, academic and research libraries face dramatic expansion in student numbers over the next five years (without a corresponding increase in financial resources) and also changes in teaching and learning patterns and practices. In addition, institutions are being required to co-operate and to compete with each other at the same time.

The situation in other parts of the world displays remarkably similar characteristics. For example, a series of workshops organized during 1991 by the US Research Libraries Group for university provosts and library directors identified the following list of emerging trends (which are not in any order of priority).[1]

### EMERGING TRENDS

* Developing the National Research and Education Network
* Strengthening undergraduate education
* Increasingly constrained budgets
* Proliferating information sources and spiraling costs of materials
* Pressing space and facilities maintenance needs
* Changing scholarly communication system
* Expanding international studies and programs
* Increasing interdependence of library and computing center
* Decreasing prestige of higher education in society
* Growing difficulties in recruiting and retaining personnel
* Shifting student demographics
* Building relationships with the commercial sector
* Growing importance of government relations

*Preferred futures for libraries.* RLG, 1991

The factors outlined above have had a signifcant impact on *trends and developments in library and information services* in the UK and elsewhere. Reduced budgets combined with the steep rise in literature costs and increased demand for information have caused many libraries to make more use of interlibrary loans and remote document supply services, characterized as a move away from a "holdings" (or "ownership") strategy to an "access" (or "demand") strategy. New information technologies have not only offered a wider range of bibliographic services but have fundamentally changed the style of service provision. CD-ROM products have proved popular with both library staff and users as a cost-effective, user-friendly means of conducting database searches. In many libraries this has led to a decrease in the volume of online searches - and also a further increase in interlibrary loan requests - with end users being able to carry out their own searches, rather than relying on library staff to act as intermediaries. There has also been more emphasis lately on full-text (as opposed to bibliographic) databases, improving the scope of services available to users.

The requirement for library managers to demonstrate value for money has tended to focus attention on providing services to meet specific user/customer needs, and there has been widespread adoption of commercial marketing techniques in the design, development and delivery of information services, tailored to the needs of particular client groups. The trend towards treating information as a tradeable commodity, combined with financial and other pressures, has led some academic and public libraries to introduce new fee-based information services, often specifically aimed at the local business community; other libraries have felt obliged to impose charges for existing services to their primary users, which were previously provided free.

Technological developments have given library managers a wider range of options from which they can select the best mix of facilities and services to meet the needs of their customers in the most cost-effective manner. Previously, the quality of a library tended to be judged on the basis of the size of its collections of books, journals and other materials; today, the emphasis has shifted from collections to services, to the delivery of documents and other information to the customer, irrespective of its origin. The concept of the electronic library offering direct access to users from their own desktops is a reality. In practice, few libraries wish to abandon completely the traditional role of collecting and housing material, but already there are examples of institutions (such as

Aston University) which have adopted a deliberate strategy of combining a much reduced locally-held core collection to meet primary needs with rapid and comprehensive access to external sources, identified through a range of information services and backed up by an effective document supply service.

The options can be viewed as a *spectrum of library models*, from the traditional reference and lending libraries through value-added information services and self-service facilities to the networked library, providing access to local, national and international resources from remote locations and fulfilling the role of an information gateway or electronic switching centre. (The models are not mutually exclusive - most libraries contain elements from more than one.) The shift towards the self-service library has enabled a redefinition of the role of academic subject librarians or information specialists, with a change of focus from carrying out searches and providing basic skills training to advising on search systems and strategies, contributing to teaching programmes alongside academic staff, and offering services more akin to consultancy in information management.

The management implications of the trends and developments indicated are profound and have affected libraries at a more fundamental level than simply extending the range of service options. In his recent review of academic library management, James Thompson (Librarian of Birmingham University) identifies a number of distinct shifts in style and emphasis that can be traced back over several decades to their origin with the progressive automation of library housekeeping systems in the 1960s: autocratic management giving way to a group or team approach, recognizing the specialist knowledge needed; a more disciplined approach to costing library operations, necessary to secure funding for expensive projects; a move away from compartmentalization towards corporate/organizational thinking as previously separate library operations began to converge through automation; redefinition of the division of labour - the responsibilities and duties of so-called professional and non-professional staff - resulting in the upgrading of library assistants' skills and the assumption of a more entrepreneurial role for librarians; and an enhanced profile for the library within the institution as it became a major computer user.[2] This analysis suggests that while government pressures and general management trends have undoubtedly added impetus to the development of a more "managerial" approach to librarianship, computerization has in itself been a major determinant of the path followed.

## Staff Development and Training

It is a truth universally acknowledged that staff development is "a good thing", and its critical importance in managing change has been duly publicized. There is no shortage of literature on the subject; the range of external courses, seminars and workshops on offer has never been broader; and many libraries can point to substantial in-house provision. Nevertheless, evidence on the ground suggests that there is a significant gap between aspiration and achievement: the feeling persists among many library staff - even in libraries which have invested substantially in staff development - that they are simply not given the opportunities to enable them to achieve their full potential, nor to contribute to the effective development and delivery of services. Identification of the topics and issues that must be covered is relatively straightforward; selecting appropriate methods or styles of delivery is more complex; but ensuring efficacy remains the ultimate challenge.

Information technology developments have obvious implications for specific skills training, which must cover: the use of library automation modules for acquisitions, cataloguing, circulation, interlibrary loans and serials control; instruction in searching online and CD-ROM databases, and the use of communications packages and personal bibliographic management software; and also office automation software for word processing, spreadsheets, graphics, desktop publishing, electronic mail, etc. Professional updating is needed to ensure that staff are aware of relevant aspects of copyright regulations (especially in the context of "electrocopying") and data protection legislation, and also keep abreast of developments in cataloguing, indexing, and other technical specialisms. Other competencies required of library and information personnel today extend beyond the topics traditionally covered in professional education and training and include subjects typically found in business and management courses, such as financial management/management accounting, strategic planning, marketing, human resource (personnel) management, organization behaviour and culture, as well as a range of personal and interpersonal skills (e.g. time management, report writing, public speaking, negotiating techniques, team leadership and motivation).

The holistic nature of management can be illustrated here by considering the range of competencies associated with managing a library cost centre. A typical course in management accounting might include different types of accounts, budgeting techniques and costing methods, as well as internal control mechanisms and investment appraisal techniques. But the cost centre manager also needs to have some knowledge of strategic and operational planning, familiarity with local management information systems, and an understanding of output measurement and performance indicators. Personal computing (e.g. spreadsheets) and negotiating skills will also come in useful, as will an appreciation of motivation theory in relation to target-setting and the behavioural aspects of budgeting.

A more controversial question centres on who needs to be trained/developed in what areas. The sharp divide which used to separate “professional“ and “non-professional“ work is gradually disappearing as support staff take on more demanding tasks (notably as a result of automation) and their key position in managing the customer interface is properly acknowledged. Libraries are essentially about team work, and all our staff need both technical expertise and people-oriented skills because of the interactive nature of their work. Training in personal effectiveness and interpersonal skills, which is receiving increasing emphasis in management development programmes, is of fundamental and central importance to all library staff. Oral and written communication skills, interviewing and negotiating techniques, the ability and willingness to work as a team, are needed by front-line staff and senior managers alike. Time management, personal computing skills, performance measurement and project management tools are applicable at every level of library work. The general move towards participative management has encouraged wider discussion of strategy and tactics and acknowledged the valuable contribution that front-line staff are capable of making to decision-taking, especially in areas such as marketing and public relations. Thus the clear-cut distinction previously drawn between professional and non-professional is no longer valid; instead, we are increasingly seeing everyone contributing his or her own expertise to the delivery of a professional service, while still recognizing that the level of knowledge and skills required will vary according to individual job specialisms.

Methods of delivery are also evolving in response to changing needs with a marked shift towards work-based learning (either on-the-job or off-the-job) using - for example - case studies, role plays and special projects for individuals or groups, in preference to more passive modes such as lectures or seminars. Other means of developing people include job rotation, staff exchanges or placements, counselling and mentoring relationships. At Aston, we have found that in-house tailored workshops can have advantages over standard external programmes in being context-specific, encouraging pragmatism and enabling participants to focus on outcomes, often with some follow-up action built in to the process. In addition to successfully addressing particular issues, more generally they can facilitate team-building and usefully foster a participative management style. We also regularly use project groups to develop plans and ideas that may lead to changes in Library & Information Services' (LIS) policy and services; such groups can help staff without formal line management responsibilities to develop team leadership abilities. Project work also offers an opportunity to introduce planning and budgeting techniques to a wider range of staff, and it certainly tests time management capabilities and interpersonal skills. The deliberately non-hierarchical cross-divisional nature of the groups again encourages participation and also serves to improve communication between different sections.

Much thought has been given recently to the infrastructure needed to support such activities, highlighting the importance of *top management commitment*, as evidenced by a formal policy statement, the appointment of a senior member of staff as co-ordinator, and allocation of sufficient resources - both money and time. Policies and programmes will not produce results without genuine commitment - not just compliance - on the part of all concerned. The critical factor here is getting the message across that staff development and training must be a *continuous process* and a *shared responsibility* between the individual and the organization; it is not a luxury to be dropped when the budget is under pressure. The library's human resources strategy must be an integral part of its overall strategy. Line managers must understand that they are responsible for ensuring the development of relevant skills and knowledge by their staff, and that this is their key task as enablers, motivators and supporters. Individuals in turn need to understand that an active/proactive approach on their part is essential to the process, and to see action-based learning on the job as a fruitful opportunity for development. A model produced by researchers at Ashridge Management College for its "Management for the future" project offers a useful illustration of the different ways managers perceive training and development.[3]

| Fragmented approach | Formalized approach | Focused approach |
|---|---|---|
| Training is | Training is | Training and development is |
| * a cost not an investment | * systematic - part of planned career development | * a continuous learning process |
| * not linked to organizational goals | * linked to human resource needs | * essential for business survival |
| * perceived as a luxury | * linked to appraisal - individual needs | * a competitive weapon |
| * directive | * knowledge-based courses plus focus on skills | * linked to organizational strategy and individual goals |
| * in training department | * linked to career development | * on-the-job + specialist courses |
| * primarily knowledge-based courses | * carried out by trainers and line managers | * self-selected |
| * about training not development | * linked to job by pre-/post-course work | * usually non-directive, novel methods |
| | | * line managers' responsibility |
| | | * tolerant |

Some libraries have not moved beyond the "fragmented" approach, others have progressed to the "formalized" stage, but only a few even begin to approach the "focused" model. At Aston, we have recently produced a Staff Development and Training Policy Statement, which confirms our adoption of the focused approach and clarifies our policy in relation to individuals' future career needs, as well as setting out the roles and responsibilities of the Director, Head of Management Services, line managers, individual staff and the University's Staff Development Office. We plan shortly to experiment with a Self Managed Learning programme (following the approach pioneered at Roffey Park Management College in Sussex) using "learning contracts" with staff working in small groups or "sets", facilitated by an adviser. This particular approach bears some resemblance to the Framework for Continuing Professional Development, recently launched by the UK Library Association, based on a "personal profile" workbook.[4] However, Self Managed Learning is arguably a more rigorous - and rewarding - method, and constitutes a management development exercise in itself, as the learning process is designed to replicate the real process of managing.

## Structures and Styles

In order to secure the sort of commitment which will help a library to become a "learning organization", it may be necessary to look at aspects of organizational structure and culture. Many libraries are organized and managed in a way that quite clearly inhibits learning and development; others are moving away from the traditional hierarchies and division between professional and "non-professional" staff, introducing flatter structures and devolved budgeting, using matrix management, and aiming to create a supportive climate - one which welcomes experiment, provides feedback, accepts mistakes, respects the individual, and encourages questioning of the status quo. In a thought-provoking review of library management styles and structures, Maurice Line points out that a proliferation of grades does not necessarily require a corresponding number of levels in the hierarchy, drawing attention to the tendency in the public sector to make this assumption.[5] He advocates a non-hierarchical style, if the structure cannot be satisfactorily dismantled. At Aston, we have recently flattened our structure by deleting the post of Assistant Director and creating a senior management team which comprises the Director and four senior colleagues on different grades - some on the same grade as colleagues who are not members of this team, but have substantial functional and staff management responsibilities. In addition, we have delegated financial responsibility, through a system of devolved cost centres, giving staff responsible for delivering services control of appropriate resources.

Hierarchical structures have been typically associated with poor communications and slow decision-making, stifling individuality and creativity, encouraging compartmentalization and grade/status-conscious behaviour. In particular, hierarchies are thought to inhibit change, thus making them unsuited to the turbulent environment in which libraries currently operate. An alternative to the traditional hierarchy is the matrix structure, which in contrast acknowledges the interdependency of library operations, and can assist co-ordination, facilitate team work, enable more rapid responses, promote flexibility, foster individual initiative and - especially important - allow innovation.

There can be benefits in introducing some elements of matrix management, within a more traditional structure - not least because this allows a more manageable, evolutionary approach to bringing about change. We have done this at Aston in the systems area, where the Head of Systems manages a team of senior and support staff responsible for the day-to-day operation and planned development of our library housekeeping system, drawn from different sections of LIS. In a less formal manner, our project groups (referred to above) fulfil a similar function, and these limited-life groups may be reconstituted as permanent teams after the project phase is completed if we see a need for a continuing cross-divisional focus on particular services or activities (such as our Reading Lists team, which involves staff from Information Services and Acquisitions). Beyond LIS, we are adopting an informal matrix structure working with colleagues in Information Systems (IS) and in academic departments to achieve a more integrated approach to supporting and encouraging the use of bibliographic and other information systems. We envisage the formation of learning/research support teams, whereby the relevant LIS Information Specialist and IS IT Specialist work with Departmental Computer Officers to provide integrated guidance and support to staff and students.

## Strategic Management

Numerous authors have commented on the purpose and benefits of strategic planning for libraries. Formal plans are often required by libraries' parent institutions or funding agencies, notably to support requests for financial resources. Planning provides a framework for policy-making and decision-taking, which forms the basis for subsequent actions. By documenting and publishing their plans, libraries can communicate their mission and objectives to both internal and external audiences; they can thus educate the community, raise their profile and gain visibility with key opinion formers. Consulting the various stakeholders and encouraging their participation in the planning process helps to secure relationships with other parts of the organization. Creating a shared understanding of the library's purpose also tends to strengthen commitment and improve morale of library staff, and the planning process itself can be used as a team-building and staff development exercise (developing abilities in data collection/analysis, creative thinking, writing, etc).

Strategic management emphasizes the systematic management of discontinuous change, acknowledging the need for continuous monitoring of a rapidly-changing environment, rethinking and reordering of priorities based on environmental issues. Its importance for libraries in today's difficult and turbulent times is obvious. The planning process involves a number of key steps or phases, some conducted in sequence, others in parallel: analyzing the external environment, to establish the operational context; appraising the library itself, and its parent organization; assessing the needs of existing and potential users, i. e. the market; creating/reviewing the library's vision, mission, objectives and goals; identifying major directions or "key result areas"; formulating strategies, together with costed action plans and performance indicators; communicating plans to all library staff, the parent institution, customers and the wider community; implementing, monitoring and evaluating progress against objectives and environmental influences. As work proceeds and new information becomes available, earlier ideas may need rethinking and it may be necessary to repeat steps several times. Strategic planning is essentially an iterative and interactive team process, involving people at all levels.

All the available evidence from libraries suggests that a participative approach to planning leads to a much better result, in respect of both the content of plans and commitment to their implementation. While all the steps indicated are important, probably the most crucial are those relating to the development of a strategic focus: clarifying the desired future state, and the purpose and distinctive approach of the library; setting out broad objectives and specific goals; and articulating key result areas. It can take a long time to develop and formulate such statements, particularly if managers are intent on combining "top-down" guidance with "bottom-up" input, and ensuring that the outcome is acceptable to all concerned. However, experience shows that this is time well spent: if there is general agreement within the library on the overall strategy, operational decisions can be successfully delegated to an appropriate level and actions taken quickly, to the mutual benefit of staff and users. Without this framework, a management style emphasizing delegation and participation may be a recipe for disaster as there will be a multiplicity of views on the library's purpose and priorities. At Aston, we have recently invested a lot of time in the above processes; we now have agreed vision and mission statements, as well as a list of "critical success factors", defined here as a list of "distinct and specific issues, which taken *together* are *necessary* and *sufficient* to accomplish the mission".

## TQM

Total Quality Management (TQM) is a philosophy - a way of life - which is increasingly being adopted by all types of organizations, including libraries and information units. At Aston, the formulation of our vision and mission statements and identification of our critical success factors was undertaken as part of a wider University initiative to introduce TQM throughout the institution. TQM assigns the highest priority to the satisfaction of customer needs. The essence of TQM is that quality is everyone's responsibility; it is characterized by customer orientation, employee involvement and continuous improvement of products and services, and thus merits the description of a managerial approach ideally suited to the library of the future. TQM also has its detractors; many critics argue that far from representing a total solution, it is simply the latest management fad, ultimately destined to go the same way as other management fashions (such as scientific management and management by objectives). TQM's mixed press can partly be attributed to the confusion of various different approaches to quality management which are currently being promoted. In a paper produced for the UK Committee of Vice-Chancellors and Principals, Professor Sir Frederick Crawford (Vice-Chancellor of Aston) draws a crucial distinction between "quality" and "standards", pointing out the essential difference between the implementation of TQM and compliance with quality assurance standards, such as the British Standard 5750 (or ISO 9000), which can be likened to the distinction between religion and law, "TQM is about aspirations that can only be approached, without perfection ever being achieved; it is not about satisfying the minimum specified standards that one can get away with".[6]

The basic idea of meeting customer requirements and getting it right first time is deceptively simple, but in order to achieve this we need to address a whole range of complex areas - including strategy, structures, systems, staff, skills, style and shared values; and issues such as leadership, commitment, ownership, team work, trust and pride. The core concepts of TQM can be summarized as an holistic approach to management, with the focus on the customer, managers acting as role models, everyone involved, synergy in team work, ownership and self-management, and (as emphasized above) continuous improvement. In short, TQM is concerned with all the areas already identified as being at the heart of the management challenges facing the networked library. Experience at Aston suggests that TQM can be an effective vehicle for change, but it must not be seen as a "quick fix". We are taking things forward slowly, concentrating on areas where success is essential, improvement is necessary and/or concerted effort will bring the greatest benefit. We have used a variety of tools and techniques in projects undertaken to date, including carrying out a detailed analysis (using flow charts) of the book acquisitions process; holding a brainstorming session to devise ways of improving services to part-time and distance-learning students; and establishing a Quality Circle to monitor and review our public enquiry services.

Although we are still at the very early stages of implementation, we feel that we have already derived significant benefits from TQM: it has helped us to clarify our vision and mission, and to identify our most critical processes; it has provided a rationale for developing performance indicators; it has encouraged participation and team work; and it has given an added impetus to service development. To sum up, TQM is assisting us with the three key issues identified at the outset: it is enabling us to gain a better understanding of the holistic nature of management, to close the gap between aspiration and achievement, and (most important of all) to put people - colleagues and customers - first.

## References

1 DOUGHERTY, Richard & HUGHES, Carol. *Preferred futures for libraries: a summary of six workshops with university provosts and library directors.* Mountain View, California: Research Libraries Group, 1991

2 THOMPSON, James. *Redirection in academic library management.* London: Library Association/Clive Bingley, 1991

3 SADLER, Philip & BARHAM, Kevin. From Franks to the future: 25 years of management training prescriptions. *Personnel Management,* 20 (5) May 1988, 48-51

4 WOOD, Kate. Genesis of a career path for all. *Library Association Record,* 94 (9) September 1992, 592-593

5 LINE, Maurice B. Library management styles and structures: a need to rethink? *Journal of Librarianship and Information Science,* 23 (2) June 1991, 97-104

6 CRAWFORD, Frederick. *Total Quality Management.* London: Committee of Vice-Chancellors and Principals, 1991 (CVCP Occasional Paper)

# Libraries of the Future : Real and Virtual

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# Libraries of the Future : Real and Virtual

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## Abstract

A library that is not a collection of physical objects - publications - in a building has so far been a contradictio in adjecto. The virtualization that started a long time ago with the distribution of library catalogues, and the concomitant introduction of interlibrary loan, is leading to a situation in which libraries will only in part be substantial.

Generalizing the concept of libraries they can be defined as collections of publications, acquired, processed, and organized for use. Acquisition does not have to entail possession of a physical item but can be a matter of right to access. The library of the future will thus be virtual for many users in the following important regards:

- the access to PACS from the users workstation means that libraries become electronic services, primarily providing access to bibliographic records and secondarily to the corresponding literature,
- the (mostly still absent but unavoidable) capability of requesting physical documents using the same PACS obviates the need for visiting the library,
- the growing number of electronic documents, that do not have to be physically present in the library, only designated as accessible and being part of the collection, implies that the collection will have a growing virtual part.

# Libraries of the Future : Real and Virtual

Virtual library seems to be the new buzzword. The mechanized automated electronic computerized libraries were all still real libraries, in real buildings with real collections of real books, with real librarians, and for real users.

The term virtual library is oftentimes used with the same precision as its predecessors, as a designation for the visions of something new and better, beyond the harsh realities of moving stock around and worrying about replacements for sick staff.

This recurring obsession by trendy snake oils merits a study of its own, which, however, will not be provided in this paper. The intent is instead to attempt a distinction of some of the meanings of the term virtual library, to provide a historical perspective, to review some of the technological background and the resulting changes in the library neighbourhood and in user behaviour, and to review some of the implications.

## Virtual Libraries

The attribute virtual seems, when applied to libraries, to have come into use

a) as a consequence of the increasing attachment (emotionally as well as functionally) by users and librarians to networks and the information access services, such as OPACs, available through them, and

b) as an allusion to that interface technology *á outrance:* virtual reality.

There are of course also subtexts, e.g. a desire to be rid of all the problems associated with reality, messy worldly matters, and to enter the clean and simple realm of abstraction, ideas and virtue, immanent in the domain electronic publications.

Etymologically the word virtual can be traced to the Latin word *virtus:* strength, bravery, derived from the root *vir:* man. Lexically there is a cluster of meanings, e.g.:

- that is so in essence or effect although not formally or actually,
- admitting of being called by the name so far as the effect or result is concerned,

- having the effect but not the actual form of what is specified,
- being more or less something in fact, although not in name,
- unmanifested,
- apparent.

In optics a virtual image is one that is generated by divergent or parallel reflected rays, and which in contrast to a real image cannot be caught on a screen or film. The images we see in an ordinary mirror, as well as the enlarged or diminished images in curved mirrors, are virtual images. In computers virtual memory is a technique to move program parts between primary and secondary memory so that the computer can process programs that take more space than are available in primary memory, by appearing to have more primary memory than there actually is.

A virtual library could thus be a number of different concepts, but first we have to make distinctions between virtual as relating to

- the factuality (form/actuality) and substantiality (essence/effect) of the library, vs.
- the perception by the user.

An entity that factually and substantially is a library (formally is a library and performs library functions) is a real library. An entity that is not factually but is substantially a library is a virtual library. An entity that factually is a library but not substantially is an illusory library, and an entity that is neither factually nor substantially a library is a non-library. We thus get the simple table below.

| | Factuality true | Factuality false |
|---|---|---|
| Substantiality true | **Real library** | **Virtual library** |
| Substantiality false | **Illusory library** | **Non-library** |

The distinctions leading to the table above do not take into consideration the perception of the user. They have been made from an observer perspective, based on the assumption that these matters (factuality and substantiality) can be determined objectively. Another type of virtuality is the one e.g. encountered by the user of a remote OPAC. There is a real library, but not where the user is, or not according to his/her perceptions. To the table above we would need to add a third dimension with user perception: true or false, or rather whether the user's perception of substantiality and factuality are the same or other than the "objective" case. One of the ways of doing that would be to replace the table above with one like the one below in which is indicated the situation for each of the "objective" cases with designations for the two cases of the user's perceptions of them, hence

| | Factuality true Perception same | Factuality true Perception other | Factuality false Perception same | Factuality false Perception other |
|---|---|---|---|---|
| Substantiality true perception same | **Real library** | ? | **Virtual library** | ? |
| Substantiality true perception other | ? | **Hallucination** | ? | ? |
| Substantiality false perception same | **Illusory library** | ? | **Non-library** | ? |
| Substantiality false perception other | ? | ? | ? | ? |

Most of the new slots are empty because they just bring new questions: What is the "other" that the user perceives? So, instead of attempting to fill in the various slots and invent designations for them and then become entangled in the "other" perceptions of the users a pragmatic approach will be taken. A virtual library is, using the definition above, something that

1) performs library functions although it

2a) is not factually a library, or

2b) is not to the user's perception a library.

Remote libraries are therefore considered to be virtual.

This approach enables us to focus on two questions that are constructive for the discussions of virtual libraries, viz.:

- What functions does a library perform? and
- What is meant by not factually being a library?

To answer these questions a detour will first have to be made.

## A Brief Look Ahead

The codex, the book as we today think of it, has proved to be an extremely viable form and there is no indication of its disappearance in the foreseeable future. Libraries, (starting with a tentative definition) as collections, organized for use, of physical objects (i.e. codices) that contain/carry published writings, will hence also continue to exist.

That is, however, not in contradiction with the developments that now are clearly visible and which are changing radically the situation for many of the creators/users of documented knowledge, experiences, sensations.

Electronic media, the many forms of which are now in a slow process of integration, have characteristics that differ radically from the print-on-paper that so far has dominated as medium for text and pictures. These differences have consequences for e.g. the concept of publishing, and thence for the concept of a publication, which, as regards texts, has been closely connected to the (re)production process - printing.[1]

It is almost a truism, but still needs to be emphasized, that the developments in electronic media will impact libraries, if in the definition of library above the limitation physical object is removed, that is, if we slightly extend the tentative definition of a library, hence: libraries are collections of published writings, organized for use.

## The Docuverse and Partial Collections

Ted Nelson has coined the term docuverse (universe of documents) as a designation for the totality of all documents.

If we delimit our discussion to that part of the docuverse that encompasses traditional text based published documents and regards some of the different types of selections, collections, that can be defined, then a library can, with some simplifications, be said to have been a real collection, that is a selection for one or more virtual users, i.e. the envisioned users.

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[1] This paper is in itself an example of these differences, although that is not apparent in the form that this paper has in the published printed proceedings that it is part of. The paper might best be characterized as an assemblage of parts (text and graphics) of earlier unpublished documents (some of which have been translated from Swedish into English, some have been edited, albeit only slightly) by several people, some of which are not mentioned as authors above, new material originally written for this paper, and additions from the oral presentation. Most of those documents are available on a local network of SUN-workstations but several different editors have been used in producing them and the version of the paper included in the proceedings was produced on a Macintosh using Word (which implied a number of file translations and transferrals) and then finally translated to Word for MS-DOS, as requested by the editors.

The bibliographic databases that are represented by indexing and abstracting journals can likewise be designated as virtual collections since there is no real collection, only a (virtual) subject, defined, as it were, by its literature, which also is a selection of the docuverse.

National bibliographies or publisher catalogues can, in the same vein, be regarded as selections from the docuverse on formal grounds.

Other coarse delimitations of the docuverse can of course be made, e.g. sound/picture-based documents, or all the private documents of an individual.

Electronic "documents" and their relations to "documents" as well as traditional documents are of course that part of the docuverse that is of primary interest in this paper, especially those electronic "documents" that can be characterized as publications.

## The Virtualization of Libraries

Libraries have for a long time been part of a process of virtualization. The ultimate consequences are a completely virtual library, i.e. a library without walls and without codices.

Very early in the history of libraries the distribution of catalogues was used to propagate information about the collections of different libraries. Before the distribution/publication of catalogues a user had to visit every library of potential interest just to investigate their holdings. Published catalogues thus meant that the users could "use" (i.e. screen) libraries without visiting them. In parallel with these developments bibliography, as the art of cataloguing of abstract collections, evolved.

The establishment of union catalogues, was both the first formation of a kind of virtual collection, and eased the comparison of the holdings of several libraries. With the advent of regular mail distribution there was a basis for the development of interlibrary loan and hence for actually accessing the collections and items from a distance on a routine basis. These early transformations can be regarded as the first phase of the virtualization of libraries. The transitions were gradual and relatively continuous and were probably often perceived by both librarians and users more as improvements in service than as a new perspective on the library concept.

Users of union catalogues do not necessarily perceive the local collection as one library and the other co-operating libraries as other distinct libraries. The union catalogue is for them rather a description of documents available in a large virtual library.

The second phase in the virtualization process was entered with the introduction of document delivery services. These were partly offered as a consequence of the use bibliographic databases, since they only indicate the existence of a document, not how to get access to it.

The third phase commenced recently as OPACs and other information access services became available outside the libraries, in offices and homes. OPACs and bibliographic databases were initially available mainly to librarians, information brokers, and other information professionals. With the increase of computer use, especially with the infusion of PCs and networks into offices, many "end users" have began to use such services themselves. To the user of OPACs that are "present" in the office the "library" is virtual, especially if the interesting documents can also be ordered and received without visiting the physical library.

The fourth phase is being initiated as more documents are produced and distributed in electronic forms, with concomitant potential for delivery by wire, or even wirelessly; in the most primitive cases as fax, in simpler cases as just text and in the more advanced cases as exact correspondences to printed publications. Already, in some cases, and eventually in many cases, the electronic forms of publication will be the dominant, preferred, and only form of publishing. The result of these late virtualization processes is that the user and the docuverse, collections as well as the documents in them, now appear to approach each other, while the user and the library seem to retreat from each other. The early virtualization developments in the library world had the opposite effect, an increasing distance between the users and the docuverse, but a decreasing distance between users and libraries.

### The Views through the Windows on our Screens

At the Department of Computer and Information Science of Linköping University (of which LIBLAB is a part) all the employees have a SUN-workstation that is connected to the Department's local network. That local network is connected, through the local network of the university, and through SUNET, the Swedish University Network, to Internet. Through these networks a large number of information services and sources are available, all of them equally close from a functional point of view. One of the conceivable orderings of these services and sources could be by a kind of distance: my own, LIBLAB's, the departments, the university's, Swedish, Nordic, European, the world's. In practice we perceive everything beyond the department as being equally remote or close. Physical or organizational distance is replaced by the ease/difficulty of access and use, and by the need to consider time zones and e.g. their effect on traffic volume with its consequences for response time.

The virtual library that we see through our windows has, like any other library, a number of sub collections. There is, however, no one who performs the planned structuring and organization of the collection. Broad categorizations have to be invented and modified as technology, services, sources and uses evolve and are discovered. In a very schematic approach we could first make a distinction on the basis of contact, i.e. between those that

- have to be contacted every time we want to use them,
- have to be contacted once, for initiating their services to us,
- themselves contact us,

and then by what is available, e.g. :

- sources
  - references, catalogue records, etc.
  - messages, discussions, etc.
  - texts, pictures, sounds, etc.
  - software
  - ...
- services
  - guides, catalogues, etc.
  - discussion, news, etc.
  - processing,
  - ...

and lastly by structure:

- centralized,
- distributed.

The conceptual space established by these three dimensions of categorization seems adequate for a broad characterization of the networked sources/services that can glimpsed through the windows.

## Real and Virtual Documents

In the discussion so far the documents have been held constant, assumed to be traditional, or, at the most, electronic reproductions/generators of print on paper. The changes and virtualizations that have been discussed with respect to libraries and their neighbourhoods are also affecting the documents themselves.

### Texts and documents - a generalization

Information is today conceived of as residing in text and numbers and the word document evokes associations of letters (and perhaps figures or pictures) on paper.

Texts, written representations of language, have since the invention of writing, and especially after the revolutions caused by the printing press, become the major form for transmission of information across the boundaries of space and time. The term document has become equated with the carrier of a text although document in general denotes *"something written, inscribed, etc., which furnishes evidence or information upon any subject, as a manuscript, title deed d, coin etc."* (The Shorter Oxford English Dictionary on Historical principles 3rd. ed.)

Libraries are one of the responses of societies to the inventions of writing. (Examples of other responses are: archives, institutionalized teaching of writing and reading, copyright.) These, and other, social institutions have slowly evolved as solutions to the problems of to coping with the multitude of documents generated through the ages. Changes in the means for producing writings and in the physical carriers of the writings have hence always had consequences for libraries as collectors of writings.

Artefacts, small and large, as well as processes, e.g. customs and procedures, and structures, e.g. of organization, are also important carriers of culture and could therefore be regarded as documents carrying "texts" which, however, are not as easily "read" as ordinary text. The information that can be elicited from them by a trained "reader" is usually transcribed into "ordinary" documents, viz. the notes, photographs, sketches etc. collected by an ethnographer in a field study.

Museums are the social institutions that for (small) artefacts (and objets trouvées) perform the same functions as libraries and archives. For large artefacts, which by their nature cannot be collected and organized in a manner similar to that of museums, there are usually also social institutions, e.g. a Department of Antiquities.

All the "documents" are, with different proportions, carriers of a mixture of:

- explicitly/directly accessible information,
- implicitly/indirectly supplied information,
- experiences/sensations (pleasure, entertainment etc.), and
- cultural heritage.

The differences are partly in the proportions of the mixture and partly in the media that the documents are carried by, and partly in the representation of the directly accessible parts.

## Electronic documents

Electronic documents are accommodating in an increasingly integrated fashion most forms of transcription and presentation of information. An electronic document can besides text contain e.g. sound and animated images in colour. The hypermedia concept, of open ended non-sequential, reader determined use of integrated multimedia document databases also has the consequence that our conceptions of a document have to be reconsidered. A specific path through a large hypermedia database is also a document. Electronic documents are also plastic, malleable and dynamic. Many of electronic documents also exist in variants, each variant with a number of versions, and might be without a defined closure. Such electronic documents are hence more like a collection of related irregular serials.

Some of that which paperbound documents were used for is now represented and mediated by completely new forms. The knowledge bases of expert systems as well as simulators that let the user experience and test skills are examples of virtual documents in which the document is in the background and the use in the foreground. Virtual realities that probably eventually will replace the WIMP (windows, icons, menus, pointers) interface to computers can be regarded as an extreme case of simulators and documents.

## Dynamic documents

Some of the traits that we associate with traditional documents are permanence, immutability, and circumscription (completion, closure). In the electronic domain a sequence of characters has so far in a similar manner been confined in a file. They are both restrained in extent, content and form. Electronic documents are, however, unique with respect to the possibilities for manipulation and modification of them.

One of the first steps towards dynamic documents, partly within a framework of a traditional concept of documents, is being taken by Microsoft's OLE (Object Linking and Embedding) and HP's New Wave that makes it possible for electronic documents to contain e.g. text, graphics and spreadsheets that are linked to each other and automatically update one another, whenever one is changed, using DDE - Dynamic Data Exchange.

Ted Nelson and his collaborators have for more than 20 years been working on the information handling system they call Xanadu. In Xanadu documents can be changed along two dimensions: sequentially, and laterally. A sequential change takes place when we create a new document by editing an old one, thus creating a new edition. A lateral change happens when we make a copy of a prior document and then allow both to exist and change independently, thus creating co-existing variants. To enable description and recognition of variants and editions every document has to be equipped with an identity and a status description. The identity, that represents the users conception of the document can be e.g. a title or an ISBN. In Xanadu this identity is called a Bert and Xanadu generates this Bert, guaranteeing that it is unambiguous and unique. The status represents the underlying representation in the system at a given time. The Xanadu designation for this is the Stamp. Every Stamp belongs to a Bert. A Bert remembers all its old Stamps and it is therefore always possible to pull out old versions and editions of a document. It is also possible to freeze the Bert, make further changes, laterally as well as sequentially, impossible.

To the description of the document also belong three descriptive spheres, the data sphere, the link sphere, and the work-type sphere. The data sphere describes the contents of the document, the link sphere the links that relate to the document. The work-type sphere specifies the kind of type the document is and whether it is part of a larger compound work.

The Xanadu model admits the handling of self-describing, dynamic document parts of a document with preservation of control. Naturally new problems arise with the new possibilities, e.g. who is to be considered the author of a virtual document that was created by three people, merging parts from ten different documents? In Xanadu there is something called endorsement that can be applied by whoever wants to take responsibility for a specific edition.

## Self-describing documents

In an environment where documents either are part of a large virtual collection or completely independent a number of problems arise. The cases in which there is a need to use parts or the whole document, e.g. in the form of quotations, or to just look at a part because it has been found in a retrieval, will be common. If the documents and their parts have been properly marked up using e.g. SGML or ODA, or HyTime for entities in space and time, then the context of the part can be indicated easily.

## A User's Perspective

Information technology has done more for increasing the amounts of writings and the means for distributing and making them available to a larger number of people than ever before, but, assistance for coping with the increase has not been provided by information technology to the same degree. Filtering and organization of the information available and coming in to an individual has to a large extent to be performed "manually" on a piece by piece or channel by channel basis.

In addition to the extremely large amount of traditional print on paper documents there are now becoming available a vast and rapid flow of electronic documents to those that are connected to the Internet.

Email, listservers, newsgroups etc. change the way we acquire information.

Listservers are easy to subscribe to, but the total input is difficult to screen. Listservers replace books, journals, etc. because their emissions they arrive in our offices constantly, and accumulate, one has to unsubscribe or be overwhelmed. There are no good information management tools as yet for this kind of situation. It is very much the situation that news editors face.

## The Library of the Future : Real and Virtual

The library of the future will for many people continue to be a traditional, real one, with books on shelves in buildings, but there will also be completely virtual libraries and varieties that we can only vaguely envision. Many users will, initially in their offices and later in their homes, use only virtual libraries.

The virtual libraries of the future will not differ from their real counterparts except for the fact that there are no tangible buildings, collections and documents.

We can distinguish three degrees of virtuality for libraries:

- VL1: access to an OPAC, electronic loan requisition, and delivery and pick-up of (traditional) documents at the users desk, but in the background still a real library. This might be characterized as the virtual library, real collections, real documents,
- VL2: same as above, but in the background no physical collection, instead a (traditional) document delivery function. This could then be characterized as virtual library, virtual collections, real documents,
- VL3: access to an OPAC, electronic loan ordering and document delivery, i.e. virtual library, virtual collections, virtual documents.

A truly virtual library is still essentially the same as a real library of today: a selection of published documents, organized and made available for use for a defined user population. The difference is that the collection is not defined by the physical documents that are collected in a building but by other criteria.

From the user population point of view a traditional library performs three basic functions for its users, it:

- selects, builds a collection, by
  - monitoring the streams of new publications, and

  - evaluating the items considering e.g. potential usage by the user population,
- acquires physical items, in order to
  - provide access, and
  - solve the copyright problem,
- organizes the collection, by
  - performing authority control, and
  - collocating documents, and their representations.

A virtual library of type three differs mainly by not necessarily acquiring documents, by instead providing the right to access, and the means, for its users. There is still a need to monitor and evaluate in order to select subsets of the total publication stream. Somewhat ironically it would, from the users point of view, seem to be a kind of defeat, a failure, if their virtual library were to abstain from the monitoring and evaluation process and simply say that the collection covers everything published.

Since in a VL3 there is no physical acquisition before access and use it is conceivable that such a library would economically be based on a pay per use instead of pay per item. Frequently used items would be expensive but on the other hand unused items would not cause any costs, neither for acquisition nor for processing and storage. Whether a virtual, pay per use, library is more costly than the present is thus an open question and the issue is further complicated by the fact that most libraries will be amalgamations of old models and new.

# Librarians, Technology and Mediocrity

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## Abstract

**Two years ago the author gave a keynote talk at the Essen Symposium that suggested that technology has lulled librarians into a false sense of security and that there is no real evidence that the increasing use of technology has improved library services at all. This talk carries this theme one stage further, suggesting that technology may actually encourage mediocrity in library and information services.**

# Librarians, Technology and Mediocrity

I gave the opening talk at this conference two years ago, and I began it with a warning. I warned that I would be deliberately provocative and asked the audience to please view my remarks in this light. I think I will be no less provocative today.

There is little reason to remind this audience of the impact that technology has had on libraries in the last thirty years. Besides the obvious improvements in recordkeeping and related activities, virtually all libraries, at least in the most developed countries, are now members of networks that greatly facilitate the location of sources of information and the gaining of access to them. Card catalogs have largely been replaced by online catalogs and these are being enhanced through the addition of materials not previously included. The whole idea of what a catalog is or should be is changing; it is no longer seen as a tool bounded by the collections of a single library but one that reveals the availability of resources in a variety of libraries or even one that is essentially a gateway to a universe of information resources, printed and electronic. Use of terminals or workstations to access databases of various kinds is now routine for many libraries, and most libraries now add electronic resources to their collections in CD-ROM or other forms. These developments have occurred with surprising speed, suggesting that the changes of the next decade may be much more dramatic and rapid than those of the past decade, a point made clearly by Govan (1991):

> "It is startling to realize that in 1983, as I recently read, no library owned a CD-ROM ... When one thinks of the widespread use of them today, one wonders about the future proliferation of other forms of digitized information: intelligent workstations, optical scanners and optical discs, expert systems, artificial intelligence, hypertext, broadbands and satellites, and local area networks (LANs) and other kinds of networks, as well as devices yet unknown ..." (Page 24).

There has been considerable progress, then, in library and information services over the past 30 years. Or has there? Have we witnessed progress or merely change? Our infatuation with technology may lead us to overestimate the extent of the progress that has actually occurred.

Let me set the stage for my remarks by a quotation from an unlikely source--a popular novel. In *Shibumi*, by Trevanian (1979), the author refers to a super supercomputer, Fat Boy, in the following terms:

> "Programming facts into Fat Boy was the constant work of an army of mechanics and technicians, but getting useful information out of Him was a task for an artist, a person with training, touch, and inspiration. The problem lay in the fact that Fat Boy knew too much. If one scanned a given subject too shallowly, he might not discover what he wanted to know. If he scanned too deeply, he would be overwhelmed with an unreadable mass of minutia: results of former urine tests, boy scout merit badges won, predictions in high school annuals, preference in brand of toilet paper. The First Assistant's unique gift was his delicate touch in asking just the right questions of Fat Boy, and of demanding response of just the right depth of scan. Experience and instinct combined to send him after the right indices, the right permutations, the right rubrics, the right depths. He played the instrument of the computer masterfully, and he loved it. Working at the computer was to him what sex was to other men--that is to say, what he assumed sex was to other men." (Page 18)*

I suggest that for many librarians, as for the First Assistant, the computer has become so fascinating that it is, indeed, now an erotic toy. However, they are probably less skillful at exploiting their toys than the First Assistant was said to be.

Fat Boy was designed to provide subject access. What progress has been made in subject access, the most important application of technology in our field? Objective evaluations of the results achieved in the searching of bibliographic databases by computer suggest that they frequently perform at a level that is less than inspiring. In the evaluation of MEDLARS reported more than twenty years ago (Lancaster, 1968) it was discovered that searches of this system, on the average, retrieved fewer than 60% of the items that a requester judged to be pertinent (i.e., less than 60% *recall*), while about half of all the items retrieved were judged pertinent (i.e., about 50% *precision*). These were results achieved by highly trained specialists spending virtually all of their time on searching this particular database.

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* This quotation is reprinted by permisson of the copyright owner, The Crown Publishing Group.

Of course, one could argue that these results would no longer apply-that the interactive nature of online systems would greatly improve performance in bibliographic searching. Regrettably, there is no evidence that this is true. Wanger et al. (1980) performed a study of 535 MEDLINE searches conducted by 191 different searchers. While the precision of these searches averaged an acceptable 67%, estimates of recall suggested that, on the average, fewer than one in four of the pertinent items were retrieved from the database (recall 23%). In a completely different environment, Blair and Maron (1985) undertook a large study of a database on the STAIRS system in a legal search application: some 350,000 pages of text (about 40,000 full text documents) and 40 information requests. Paralegals performed extensive, iterative searches online and stopped searching only when the attorneys for whom they were working were satisfied that at least 75% of the pertinent references had been retrieved. By sampling, however, the investigators estimated that no more than 20% recall had been achieved!!

The results of a very important research program have been published by Saracevic et al. (1988). For each of 40 research topics, nine separate searches were performed, each one by an experienced searcher. The most significant finding was that different searchers had quite different interpretations of a question and, thus, used different search approaches and retrieved different items. Moreover, each searcher tended to find some pertinent items not found by the others, although the chance that an item would be judged pertinent by a requester increased with the number of searchers retrieving it. Other investigators, including Fidel (1985) and McCue (1988), have also found that experienced searchers show little consistency in the selection of terms and thus little similarity in the items they retrieve.

Librarians have been extremely enthusiastic about the online public access catalog and many appear to be convinced that OPACs have greatly improved subject access, perhaps even solved the subject access problem. Two years ago at this conference I referred to a study I had recently completed for OCLC. In brief, 51 subject searches were performed in the OPAC of a large academic library. The most experienced searcher of this tool could find, on the average, little more than half of the items existing in the catalog that were on recommended reading lists prepared by subject experts. Moreover, to find little more than half the recommended items required the use of strategies so broad that it was frequently necessary to retrieve several hundred items, most completely irrelevant. Very little can be done to improve this situation within present cataloging constraints. The typical catalog record may contain only 3-4 unique subject access points (since keywords in titles, subject headings and class numbers frequently duplicate each other) and this is completely inadequate for a database consisting of millions of items.

There has been another significant breakthrough in subject access. Now library users can perform their own subject searches in a growing number of databases available in libraries in CD-ROM form. But how good are these searches? I have recently completed another study, funded by the Council on Library Resources, in which the results of library user searches in the ERIC database (on CD-ROM) were compared with results achieved on the same topics by an experienced education librarian and by a team of experienced searchers. Thirty-five searches were handled in this way. Not surprisingly perhaps, library users were able to locate only about one third of the items that they subsequently judged useful. More importantly, they could find only about one third of the really important items--the ones they considered highly valuable in relation to their information needs and that they were not previously aware of. Parenthetically, the education librarian found only about 44% of the really important items and the team only 50% of them. Perhaps most depressing is the fact that the relevant items found by library user, librarian and team frequently showed little overlap and were sometimes even mutually exclusive.

Of course, technology *has* brought significant improvements in some aspects of library service. Compared with the situation thirty years ago, interlibrary lending is more successful and more efficient, and urgently needed materials can be obtained expeditiously through telefacsimile capabilities. Nevertheless, I am convinced that certain other services have deteriorated rather than improved. I have been a professional librarian for some thirty-six years. I have been a user of libraries for very much longer. As a user, I am embarrassed by the quality of reference service I frequently receive, even from prestigious university libraries. From personal experience I know that the paraprofessionals I worked with in public libraries thirty years ago gave much better service. I believe that our library schools are largely to blame for this: we now give so much weight to technology and glamorize it so much that the basics of our profession are overlooked--the philosophy of public service, the ethics, the need (to mention a single example) for a reference librarian to have some knowledge of what is happening in the world around him.

In our preoccupation with technological resources we are beginning to overlook the more important human resources. A good example can be found in a recent article on sources of information on art history, which mentions a clearinghouse on this subject at the Metropolitan Museum of Art. The clearinghouse, according to the article, consists of a database and document collection. Personally, I would feel more confident in the service if there were some people there.

The cost of implementing the technology frequently takes away from other things, such as books. Let me quote one British librarian (Liddle, 1988) on this by way of example:

> "We recently had to face this problem in my own county when we embarked on a capital programme to computerise the library service. We had somewhere to find annual running costs of about £100,000 a year out of the existing budget. We did two things to offset this: first of course we reduced the book fund [the money for purchase of new books]. The second thing we did was to sell off some of the rare books in order to provide capital which we could apply to the capital cost of the computer system. We were not the first and I am sure we will not be the last to respond to financial pressures by selling off rare books." (Page 41)

As a profession we have become too dependent on technology. Moreover, as Harris (1992) has pointed out so effectively, the ability of librarians to exploit technology has very likely caused a deterioration of other expertise. Harris, drawing upon the sociologist Nina Toren, claims that deprofessionalization occurs when a profession loses control over its knowledge base and its service ideal. Harris believes that we are losing control over our knowledge base. Skilled professional catalogers have been replaced by network copy cataloging and, she believes, end user searching of CD-ROM and other databases will mean that the database search specialist will become less needed. Harris suggests that:

> "... the loss of the service ideal and loss of control over a knowledge base through the routinizing of professional functions, will lead to deprofessionalization. In other words, the changes underway in librarianship are likely to lead to its demise as a profession." (Page 14)

A recent article in Newsweek by Robert J. Samuelson (1992) refers to "retarded technology," which he regards as the opposite of advanced technology. Samuelson claims that "We are finding costly and complex ways to do what was once simple and inexpensive." He identifies three frivolous reasons for embracing technology: social status, adult play, and Mount Everest effect. All three are easily observed in our profession. Librarians jumped at technological solutions because they believed computers and related technologies would bring them greater prestige and recognition; there is no real evidence that this has actually occurred. Computers have become the toys of the librarian, just as they have become toys in other segments of society, but time spent playing may sometimes be better spent on other pursuits. As Samuelson claims, "computer mail has transformed idle chit-chat into an allday affair." As for the Mount Everest effect--examples of automation for the sake of automation--I will leave it to each of you to identify your own examples in the library profession.

And what of the latest playthings of the library profession? What of artificial intelligence and expert systems? Surely these technologies will eventually solve all library and information service problems?

Any discussion of applications of artificial intelligence is hampered by the fact that no universally accepted definition of the term seems to exist. Indeed, several of the books written on artificial intelligence make no real attempt to define it.* An even worse problem is the fact that the term is used so carelessly, often referring to operations (e.g., human selection from a computer-displayed menu) in which no machine intelligence is involved at all. It is ironic that work of the type performed, in the late 1950's and early 1960's, on automatic indexing by extracting words from text using frequency criteria, then considered an application of computational linguistics, should now be considered an artificial intelligence (**AI**) application.

While not a formal definition, perhaps, Fenly (1992) has offered a clear and concise statement that illustrates what **AI** is, or should be, all about:

> "... computer programs have been developed which exhibit human-like reasoning, which may be able to learn from their mistakes, and which quickly and cleverly perform tasks normally done by scarce and expensive human experts." (Page 52)

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* The objective of artificial intelligence is at least well illustrated by Kurzweil (1991), quoting Elaine Rich, as "how to make computers do things at which, at the moment, people are better."

In other words, one can say that **AI** attempts to develop systems that perform some of the tasks normally performed by experts in some area; perhaps the most obvious example is medical diagnosis. For this reason, systems of this type are frequently referred to as expert systems. The terms knowledge-based systems and rule-based systems seem now to be used more or less interchangeably with expert systems. The reason is, of course, that systems of this type must be given a body of knowledge (e.g., symptoms and signs associated with a particular disease state) to work on and some of these knowledge bases would consist of rules, such as rules for descriptive cataloging.

Because descriptive cataloging is rule-based, one would think that this activity would be a prime candidate for an expert systems application, and some work has been done in this area (e.g., Schwarz, 1986; Weibel, 1992; Jeng, 1986; Borko and Ercegovac, 1989). Fenly (1992), however, claims that the results have so far been unconvincing. He feels that a cataloging system with genuine expertise is an order of magnitude more difficult to implement than one that merely casts cataloging rules in an automated format. As he points out:

> "... genuine expert systems, with the depth and power to solve substantial and meaningful problems, are time-consuming and costly to develop ..." (Page 54)

Weibel (1992) seems to agree with Fenly to a very large extent. Although he, himself, has performed research at OCLC on the feasibility of automatic descriptive cataloging from images of title pages, he sees a "thread of unreality" in much of the research performed in this area so far. He claims that there exist "large obstacles to implementation of production systems" and that expert system techniques are "unlikely to change technical processing in the library in the next five years."

The assignment of terms to documents, to represent the subjects dealt with, is another activity that might benefit from the application of artificial intelligence. While subject indexing cannot be as rule-based as descriptive cataloging, certain rules do have to be followed. In very large systems, such as those operated by the National Library of Medicine, these rules could be quite extensive. For example, one set of rules prescribes which subheadings can be used with which categories of main headings. The interactive program, MedIndEx, being developed at the National Library of Medicine, does use expert system principles to assist the indexer in using Medical Subject Headings to represent the subject matter of biomedical articles (Humphrey, 1992). Other approaches to automatic indexing or computer-aided indexing, described in the literature, also claim to use artificial intelligence or expert system techniques. However, it is difficult to understand how systems can be considered intelligent when they merely assign index terms to documents on the basis of similarity between words occurring in document text (e.g., titles and abstracts) and in word “profiles“ associated with the index terms. On the other hand, artificial intelligence could be involved if the indexing system learned from its mistakes and was thus able to improve its own performance.

A lot of work has been done on the development of “intelligent frontends“ or “intelligent interfaces“ to aid the exploitation of databases through online networks. For example, Hu (1987) has evaluated one such interface designed to help someone select the database that appears most appropriate to use to satisfy a particular information need. Hu's study indicates that this particular interface operates almost entirely through the use of menus, from which the user makes a selection, and that it exhibits no evidence of any real “intelligence“ in database selection.

Other interfaces are designed to help a user construct a search strategy that appropriately reflects his information need. Several interfaces of this type have been reviewed by Vickery (1992) and by Alberico and Micco (1990). Some of these operate largely through menus, some prompt the user by asking him questions designed to usefully limit the scope of the search, and some will accept input from the user in the form of a narrative statement of information need. While many of these are ingenious and useful tools, it is not clear that they can actually be said to involve the use of artificial intelligence.

The universal question-answering device envisioned by Dana (1916) has not yet been achieved, but some progress has certainly been made toward the development of systems that will at least tell a library user which reference source to consult to answer a particular question. Parrott (1992) has prepared a comprehensive review and typology of expert systems designed to assist the reference process in libraries.

Many years ago, when Luhn (1959) first described an approach to the Selective Dissemination of Information (SDI) using computers, he envisioned a system that would learn from its mistakes. The profiles of interest of participants in the SDI program would automatically be modified in response to their evaluations of the notifications received. Terms appearing in the profiles would be upweighted or downweighted depending on whether they were associated with items judged by the recipient to be useful or not useful. Carried to its logical conclusion, a term would automatically be deleted from a profile if the SDI recipient repeatedly rejected as "irrelevant" the items retrieved by this term. Luhn's automatic approach to profile updating was found to be difficult to implement and was never fully adopted in an operating system. In principle, there is no reason why it should not work. If it did, such a system could be said to exhibit intelligence because it learns from its mistakes. Unfortunately, very few of the systems referred to as "expert" or as incorporating "artificial intelligence," in the library context, appear to have any true learning features.

The enthusiasm for **AI** that exists in some segments of the library profession today reminds one of the enthusiasm for machine-aided diagnosis that existed in some segments of the medical profession about twenty years ago. Machine-aided diagnosis has not been widely accepted by the medical community (Salamon, 1989; Engle, 1992). It is now realized that the problems are much greater than they once appeared to be. Human experts operate through a combination of knowledge, experience and intuition. Capturing the knowledge in some electronic form is possible, if not exactly easy, but recording human experience is a problem of a greater order of magnitude, and the replacement of human intuition is unlikely to be achieved for a very long time.

Most of the activities performed by librarians require less knowledge, experience and intuition than does medical diagnosis. Nevertheless, the problems involved in automating even the "simplest" of intellectual tasks are frequently underestimated. As Fenly (1992), quoting Davies (1986), has rightly pointed out:

> "The expertise in cataloging is not explicit in the rules; rather, it is implicit in the heuristics employed by the experts who do the work." (Page 58).

Similarly, Weibel (1992), referring to work performed by Borko and Ercegovac (1989) on the cataloging of maps, points to their conclusions that necessary expertise in such procedures "extends beyond that which is articulated in formal rule sets" and that the complexity of the activity militates against the application of an expert systems approach.

As stated earlier, a large component of "expertise" is informal and experiential in character (Bainbridge, 1991); the recorded knowledge, however detailed and comprehensive, still requires evaluation and interpretation. A person does not become an expert merely by having an expert knowledge base available to him. Indeed, the very availability of such a tool can be dangerous, for it puts decisions and actions that are properly the domain of the expert into the hands of the less qualified. One of the major deterrents to the further development of expert systems in medicine is malpractice--the danger of incorrect diagnosis and treatment--with its attendant litigious consequences (Warner, 1988; Bainbridge, 1991).

The true expert is a very rare individual. There are probably less than a dozen expert neuroradiologists in the entire United States. There are rather few expert reference librarians, and they are becoming fewer. We cannot use machines to replace the true expert in neuroradiology, although we may be able to design systems that would allow the worst of medical practitioners to make better diagnoses than they would otherwise make. We cannot replace the expert reference librarian but we may be able to design systems that would allow the worst of reference librarians to perform better. Why then do we refer to these systems as "expert" systems? Surely, "systems of mediocrity" would be a more apt description. I predict that, in the future, our library schools will concentrate on teaching students how to use such systems to exploit this mediocrity, and that the true expert--the expert cataloger, the expert indexer, the expert reference librarian--will disappear.

It is fashionable today to claim that the most important role of the librarian in the future will be that of a teacher--teaching people how to exploit information resources. But will we still have the knowledge needed to fulfill this teaching role?

The fact is, of course, that the true intellectual tasks associated with the library profession--subject analysis, interpretation of information needs, search strategy, and suchlike--are not easily delegated to machines. Whatever may happen to the library as an institution (i.e., as a collection of physical artifacts), it seems unlikely that the expertise of the skilled librarian will be replaced by AI or any other technology in the foreseeable future.

## References

Alberico, R. and Micco, M. Expert Systems for Reference and Information Retrieval. Westport, CT, Meckler, 1990.

Bainbridge, D. I. Computer-aided diagnosis and negligence. Medicine, Science and the Law, 39, 1991, 127-136.

Blair, D. C. and Maron, M. E. An evaluation of retrieval effectiveness for a full-text document-retrieval system. Communications of the Association for Computing Machinery, 28, 1985, 289-299.

Borko, H. and Ercegovac, Z. Knowledge-based descriptive cataloging of cartographic publications. In: Annual Review of OCLC Research, July 1988-June 1989; pp. 49-50. Dublin, OH, OCLC, 1989.

Dana, J. C. Libraries: Addresses and Essays. White Plains, NY, H. W. Wilson Co., 1916.

Davies, R. Expert systems and cataloguing: new wine in old bottles? In Expert Systems in Libraries; ed. by F. Gibb, pp. 67-82. London, Taylor Graham, 1986.

Engle, R. L., Jr. Attempts to use computers as diagnostic aids in medical decision making: a thirty-year experience. Perspectives in Biology and Medicine, 35, 1992, 207-219.

Fenly, C. Technical services processes as models for assessing expert system suitability and benefits. In Artificial Intelligence and Expert Systems: Will They Change the Library? Proceedings of the 27th Annual Clinic on Library Applications of Data Processing; ed. by F. W. Lancaster and L. C. Smith, pp. 50-66. Urbana, University of Illinois,Graduate School of Library and Information Science, 1992.

Fidel, R. Individual variability in online searching behavior. Proceedings of the American Society for Information Science, 22, 1985, 69-72.

Govan, J. F. Ascent or decline? Some thoughts on the future of academic libraries. In: The Future of the Academic Library: Proceedings of the Conference Held at the University of Wisconsin in September 1989; ed. by E. P. Trani, pp. 24-44. Urbana, University of Illinois, Graduate School of Library and Information Science, Occasional Papers, Numbers 188 and 189, January 1991.

Harris, R. Information technology and the de-skilling of librarians. Computers in Libraries, 12, 1992, 8-16.

Hu, C. An Evaluation of Online Database Selection by a Gateway System with Artificial Intelligence Techniques. Doctoral dissertation. Urbana, University of Illinois, Graduate School of Library and Information Science, 1987.

Humphrey, S. M. Interactive knowledge-based systems for improved subject analysis and retrieval. In: Artificial Intelligence and Expert Systems: Will They Change the Library? Proceedings of the 27th Annual Clinic on Library Applications of Data Processing; ed. by F. W. Lancaster and L. C. Smith, pp. 81-117. Urbana, University of Illinois, Graduate School of Library and Information Science, 1992.

Jeng, Ling-Hwey. An expert system for determining title proper in descriptive cataloging: a conceptual model. Cataloging and Classification Quarterly, 7(2), 1986, 55-70.

Kurzweil, R. Machine intelligence: the first 80 years. Library Journal, 116 (13), August 1991, 69-71.

Lancaster, F. W. Evaluation of the MEDLARS Demand Search Service. Bethesda, National Library of Medicine, 1968.

Liddle, D. Conservation: the public library view. In: Conservation and Collection Management; Proceedings of a Seminar at Loughborough University of Technology, 22-23 July, 1987, pp. 29-38. London, The British Library, National Preservation Office, 1988.

Luhn, H. P. Selective Dissemination of New Scientific Information With the Aid of Electronic Processing Equipment. Yorktown Heights, NY, IBM Advanced Systems Development Division, 1959.

McCue, J. H. Online Searching in Public Libraries: a Comparative Study of Performance. Metuchen, N.J., Scarecrow Press, 1988.

Parrott, J. R. Reference expert systems: foundations in reference theory. In: Artificial Intelligence and Expert Systems: Will They Change the Library? Proceedings of the 27th Annual Clinic on Library Applications of Data Processing; ed. by F. W. Lancaster and L. C. Smith, pp. 118-160. Urbana, University of Illinois, Graduate School of Library and Information Science, 1992.

Salamon, R. Expert systems in medicine. World Health, 1989 (August/September), 12-13.

Samuelson, R. J. Technology in reverse. Newsweek, July 20, 1992, 45.

Saracevic, T. et al. Study of information seeking and retrieving. *Journal of the American Society for Information Science*, 39, 1988, 161-216.

Schwarz, H. Expert systems and the future of cataloguing: a possible approach. *LIBER Bulletin*, 26, 1986, 23-50.

Trevanian. *Shibumi*. New York, Ballantine Books, 1979.

Vickery, B. C. Intelligent interfaces to online databases. In: *Artificial Intelligence and Expert Systems: Will They Change the Library? Proceedings of the 27th Annual Clinic on Library Applications of Data Processing*; ed. by F. W. Lancaster and L. C. Smith, pp. 239-253. Urbana, University of Illinois, Graduate School of Library and Information Science, 1992.

Wanger, J. et al. *Evaluation of the Online Search Process*. Santa Monica, Cuadra Associates, 1980. PB 81-132565.

Warner, E. Expert systems and the law. *High Technology Business*, 8, 1988, 32-35.

Weibel, S. Automated cataloging: implications for libraries and patrons. In: *Artificial Intelligence and Expert Systems: Will They Change the Library? Proceedings of the 27th Annual Clinic on Library Applications of Data Processing*; ed. by F. W. Lancaster and L. C. Smith, pp. 67-80. Urbana, University of Illinois, Graduate School of Library and Information Science, 1992.

# Introducing New Library Technologies to Faculty

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## Abstract

**The technological transformation within the scholarly world requires introducing and teaching university faculty new ways to conduct scholarly inquiry and gain information and knowledge. Often librarians take the lead in ensuring that faculty become familiar with, knowledgeable about, and gain expertise in the new informational and instructional technologies.**

**This presentation will cover educating faculty on the use of online catalogs, CD-ROM workstations and subscriptions, and local/national/international networks. It will cover keeping faculty informed about access to specialized databases and other information resources available on the Internet, the developing NREN (National Research Education Network), BITNET, and similar networks.**

**Preparation of faculty user education programs and faculty/librarian liaisons necessary to its success, and resources and preparation necessary to ensure that our faculty become sophisticated scholars and researchers within the more technological environment of which their students may already be more advanced will be explained. There will be some discussion of the changes necessary in position duties of librarians to undertake this role effectively and efficiently along with other traditional and new demands made.**

# Introducing New Library Technologies to Faculty

Herbert White, in his presentation, said "that teaching faculty to be end users, to do their own research is questionable, that we should not treat all end users the same, and that only 6% of faculty do research as opposed to teaching." He also said that "use of intermediaries depends on trust, built on one-at-a-time individual relationships (that there is a societal preference for intermediaries) and that without librarians to locate more relevant information faculty just accept what's there because they don't know anything else." The societal preference for intermediaries, I believe, is changing--particularly in areas such as law, medicine, and in education where many prefer to "do it themselves."

My first reaction to Herbert White's comments was to think that when I go to a doctor, a car mechanic, or an investment advisor, I may assume they are the experts, but, even so, I want them to explain to me, in layman's terms, how they arrived at their diagnosis, where they got their information, why they feel it is right for me, and what I can do to stay informed. In other words, I want to be educated before I trust them, or turn my car, or my health over to them. I may even want to get a second opinion and/or look up further information myself before I accept their diagnoses, decisions, or recommendations. But, I do agree that trust is built on developing long term relationships with individuals.

Maybe only 6% of faculty do research, but I do not believe good teaching is done without good research. I do believe that faculty may just accept what is there because they do not know anything else--that is why I see an intensive need for education.

Herbert White also said that we "should do exception reporting or analysis, not on what we are doing well, but with an emphasis on what we are not doing." He also said "that we must understand what we are not doing, that dreaming is part of management, that turf comes from being able to do something no one else can do, that we are the experts, that others are unqualified, that information is playing an increasingly more important role in the fabric of society." He said that "some do not want to do their own information work any more than fixing their own cars, that they are happy to trust the information provider, the librarian." I am not sure that I totally agree. I do not want to fix my own car--I do not have the time or the expertise, but I am not willing to allow someone else to do it either without a bit of my own research. I do not fully trust the expert until my information needs regarding that expert's knowledge and skills are proven, or at least confirmed, with some demonstration of validity and accuracy, as well as the ability to communicate what needs to be done or has been done effectively. Personally, I do not believe that faculty are willing to do so either. They may want an intermediary often, but not always.

Herbert White also said "that faculty do not care as much as we do about the learning process, that how to find things is not as important to them." Again, I am not sure that I agree. But, then, after discussing this with Herbert White during a break in the symposium proceedings, I do not believe we really have opposing views. It is just a matter of perception or emphasis, or as a Czech librarian said to me recently, "you, as most Americans, are optimistic; we, as Czechs, have a more pessimistic view--and, if you are unaware of the Czech definition of a pessimist--it is a well-informed optimist. So we will just say, for the purposes of my presentation, that I am an optimist and Herbert White is a well-informed optimist.

I should add that along with Herbert White and Peter Drucker, that I, too, accept the "moral imperative"--that somehow with or without resources we have to do--or it will be our fault. And, my perception today is that we are not doing as well for faculty what we should be doing--i.e. teaching them how to obtain and manage information and demonstrating how the new technologies can assist with this.

If dreaming is a part of management, then my dream is not to gain or retain turf by being able to do what no one else can do, not to assume that only librarians should be the experts and others remain unqualified. Information is playing an increasingly more important role in the fabric of society, and librarians should share their knowledge and expertise in obtaining and evaluating information with faculty, computer center personnel, vendors, and other users, and we should all learn from each other, rather than playing competitive roles, assuming the others to be the "lesser gods." I believe that the more we know about each other, each other's knowledge and expertise, the greater the understanding, respect, trust, and the opportunities for collaboration, and even more important--the potential to make information, not just bibliographically accessible, but more intellectually accessible. Intellectual assess requires shard minds and combined intellects.

Librarians may only have improved the tools for access, rather than how to get at the intellectual content of information, but maybe it is because we have assumed more responsibility for the bibliographical control of the literature, and left it up to the faculty to determine its intellectual content. Because faculty do not always trust librarians, nor we them, we have not worked together as effectively as we might. There are many who believe that what is taught in the classroom is already outdated. Others say that what is taught in the classroom is outdated within three and one-half years, and unless faculty begin to use the new information and instructional technologies in the classroom, their jobs, too, will be obsolete.

All of us, librarians, computer and media services personnel, and faculty, will lose out if we do not adapt to technological, informational, instructional, and other changes and transformations taking place in some areas of the teaching/learning/research, business and life processes. As much as we might like to be information intermediaries only, rather than both intermediaries and teachers of information research, information management, and information/instructional technologies, we cannot do it. There are not enough of us and we are often not available during the very hours and places where faculty conduct information-seeking. In the academic world, that is often during intercessions, holidays, late at night and on weekends, or while on sabbatical in some remote location, and in homes, offices, and conferences--rather than in the physical environs of the library.

Preparation of faculty user education programs and establishing faculty/librarian liaisons are necessary to the success of both librarian and faculty interactions. Re-education of faculty to new library resources is necessary to ensure that they become sophisticated scholars and researchers, within the more technological environment of which their students may already be more advanced, is a necessity for life-long learning, teaching, growth, and development.

The technological transformation within the scholarly community has already made its impact on the scientific community of scholars. It is beginning to make an impact on a few faculty in the social sciences, and, even a few in the humanities. Its impact on the computer centers, media centers, and the libraries has been a strong one, creating some serious budgeting deficiencies in hardware, software, networking and telecommunications capabilities, and, even more important, in staffing deficiencies. Many of us have had to reduce our already limited staffing because of the economy and high costs of stocking traditional print resources and because of the necessity of providing new technologies and networking access. Educating others takes less time in the long run than does providing information for every need--and we need this time savings. Some faculty express a concern that funds for the new technologies in libraries could have been spent more effectively on purchasing new print resources. Our push to meet the challenges associated with keeping up with the information explosion by simplifying and reducing labor-intensive operations and services through automating, and by providing greater and more rapid access to our catalogs and subject-oriented collections via development of online access and document delivery, has helped us to keep abreast and maintain control of information resources, as well as to meet some new "technological information" demands of a more sophisticated few. However, in the process our funds have been stretched beyond the limit and many faculty have been left behind or struggling with only an elemental knowledge of computer use and technological change and benefits. There are still quite a few who are not convinced that automation, online access, and networking is beneficial to scholarly inquiry and research, and maybe, rightly so, if we cannot add value via improved intellectual access. Thus, libraries and computer centers are faced with a monumental task of serving both "high-end" and "low-end" users of the new technologies, of educating the large masses of "faculty uninformed" and "non" or "low-end" users, or dissatisfied users. Many faculty recognize their own inadequacies and want to "catch-up" with their students' knowledge and expertise in the new information technologies. Others are not so far along (or they are so far ahead) that they even agree that this need exists.

The question of educating the remaining faculty, by far, I believe, the larger majority, in most of our academic institutions, is as Stephen K. Stoan (1991, p. 238-241) suggests "linked to the issue of whether they use the library effectively now in carrying on their research." As Stoan stresses, most researchers get their information by means other than through . . . reference sources in the library. Even with scientists, experts in automation, a majority of their research for information does not take place within the library, or with online searching--in fact, online was used [only] as an occasional supplementary approach to more traditional techniques." This was just as true in studies conducted of social scientists and humanists. Scholars tended to first consult their own extensive specialized personal libraries (up to 98% use this information first even if it is far outdated) and then other formal and informal communication networks. Libraries and access tools, as well as librarians' assistance ranks last among most scholars. Librarians are not viewed as experts in subject disciplines, for the most part. We should not be surprised that some in a technological environment still do not use and do not want to use libraries. We should be pleased others want to "own" electronic information or to distribute it. Its importance and support will increase. Even so, Stoan notes that these same scholars feel that "the significance of personal collections in scholarly research in no way diminishes the importance of library resources" (Stoan, 1991, p. 247).

Richard Dougherty (1991, p. 59) notes that "To succeed in an electronic information environment, research libraries will become more access oriented and less size oriented." He, too, notes "that many faculty consult libraries rarely or only as a last resort (1991, p. 60)". "The point here," he adds, "is not to criticize faculty, libraries, nor librarians" but "to focus attention on...issues" (1991, p. 61). He notes that "The technological transformation we now envision will result in a break with past traditions" and that "telecommunications networks are already beginning to alter, in fundamental ways, how faculty seek, obtain, and use information (1991, p. 59)." He (Dougherty, 1991, p. 61), along with others, including Ellen Hoffman, in her presentation at this symposium, feels that "greater attention must be paid to expanding skills of current information professionals" with "well-developed interpersonal skills, greater knowledge of information policy issues, and greater political skills...greater management and strategic planning skills, and more individuals who possess entrepreneurial talent." Stoan adds (1991, p. 254) that it means undertaking further library user education for faculty "in such areas as the mechanics of retrieving online electronic information and networking resources that may have particular usefulness to a department or to specific faculty members." Margaret Landrum (1987, p. 15) notes that "To neglect orienting faculty to the new technologies is to miss an opportunity to gain an ally for the library while at the same time providing an educational opportunity for a colleague." She says that "reaching out to the faculty member...may be the greatest challenge facing today's academic librarian" (Landrum, 1987, p. 15). She notes that "The major effort on the part of academic librarians will be to recognize that the faculty are a significant population, who not only hold the key to access for students, but are themselves in need of attention in terms of skill updating" (Landrum, 1987, p. 16).

"Multiple approaches," Margaret Landrum says, "are needed to market library services to faculty" (1987, p. 16). We may want to focus more on the assignment of librarian liaison responsibilities for each faculty member at an institution to communicate with them and assist them with library and information research on a continuing basis. We need to anticipate users' negative feelings and offset this by offering direct help at the onset of change; to anticipate anxiety with any change, to announce change well in advance, to get faculty input and involve them in planning. We need to provide a variety of options and opportunities for mastering new technologies; to demonstrate, in faculty's own research interests and teaching fields what the technologies offer that are not there with the old traditional print resources. We need to consider different learning and information-gathering styles of individual faculty members; to get faculty involved in teaching the new technologies to their students. We need to interact more with teaching colleagues in every way possible, to be visible and supportive of their curricular/research needs; to not miss an opportunity to get them and keep them informed so they won't be intimidated or angry about the change.

We must all work towards what Chuck McClure (1991) states that all users want:

1. Technology no more complicated than operating a television set;
2. A simplistic guide to what information is available and how to access it (with one set of directions), and how to print it with a push of a function key;
3. Someone to provide help as needed;
4. Not to be buried in information--and full-text, not just citations;
5. And not to have to change their lives or work habits to suit networked information systems.

Libraries and librarians can no longer be insular. We must be more visible in the teaching/learning/research process. We will be held more clearly accountable for our decisions in the future, and our mistakes because they are more visible in an electronic environment. Our staffs must learn how to deal with stress and pressure and even enjoy it and to be able to see and build connections with others. The positive aspects of working with faculty and teaching them about the new information technologies include that this:

1. Reinforces librarians as educators, partners, and collaborators, and
2. Helps gain support for, not just libraries, but librarians as a complementary, not a supplementary, aspect of higher education.

The negative aspects include that:

1. Teaching increases workloads if other services are not eliminated or reduced.
2. End users are ill-prepared or too sophisticated, making it hard to reach a balance in instructional sessions that are not individualized.
3. Machines malfunction - there is downtime and they do have limitations, especially intellectual ones.

"Today with more faculty and students owning personal computers and performing their own searches, librarians cannot expect library users, vendors, and others to automatically play by our rules (Dennis and Harrington, Fall 1990, p. 49)." Roles are not so easily delineated. Furthermore, many of our old assumptions about library users' awareness of, and capabilities of finding and using information, do not apply to today's computer-literate and illiterate patrons. Dennis and Harrington (Fall 1990, p. 49-50) also note that some "Faculty members look forward to using such technologies for research and for supporting publication and teaching activities." Their numbers are growing. They see scholarly networks accommodating full-text electronic needs, and assisting to retrieve data, download references, and integrate them into writings. Faculty are more likely to use information resources if they can do so from home and office without having to come to a physical building remote from their personal workstations.

The budgetary and personnel constraints of the 90s affect our abilities to provide information technologies, as do powerful external forces who are not asking how many books are in the libraries, but the capacity of the computing facilities and telecommunications networks. Will academic librarians take a leadership role in educating the academic community about the impact of this technology on teaching, learning, and scholarship, or will someone else, or will we collaborate more fully? I hope, the latter. Now, as more faculty apply technologies and the external environment becomes more supportive of their efforts, is the time for us to broaden our vision of information technologies to develop services that accommodate user concerns and needs. If we persist in defining information technologies solely in library terms, and teaching about them exclusively within the framework of library operations, we run the risk of becoming irrelevant to our users. Let's use the computer center, media services, vendors, and others interested in our domain to build support, not competition and further resentments.

We need a stronger partnership with faculty in the cycle of scholarly endeavor and scholarly communication, and if we teach them the operational and evaluative skills, we will gain more respect and support. And, likewise, we need greater subject expertise and access, greater participation in subject-related professional associations, and increased credibility with faculty. There is a need to forge a common understanding throughout the entire campus of the issues involved in exploiting the potential of electronic information resources.

Carol Hughes (February 1991, p. 84) suggests "structuring the necessary dialogue in such a way as to encourage the widest possible participation by members of the academic community in planning how to use electronic information resources“ and, she points out that "making decisions on how to build the campus information infrastructure of the future must be arrived at collaboratively, within a collegial environment.“

Bruce E. Fleury (Spring 1984, p. 104-105) states that "The inadequate nature of the lecture/reserve/textbook methods of teaching used by many classroom faculty - [demonstrate that they] may be unaware of contributions librarians could make to the quality of classes and university curriculum - it is up to the library to make the faculty aware of the value of library services and the potential of information technologies in educational endeavors. The end result will be better library/faculty relations and a higher quality student graduate.“

All faculty need hookups so there is no "information rich“ and "information poor,“ and they need both intermediaries and teachers. Because of this, I see the librarians' role as growing, expanded, and enhanced, not a lesser role but a greater one--shared with others who assume or share a portion of what in the past we have seen as the librarians' domain. I welcome the help and expertise in reaching a wider, better educated--more widely dispersed clientele by working with others in information access, information control, and education of all existing and potential users.

## Notes

Dennis, Nancy and Nancy Dodd Harrington. "Librarian and Faculty Member Differences in Using Information Technologies," Reference Services Review. 18 (No. 3, Fall 1990): 47-52.

Dougherty, Richard M. "Needed: User-Responsive Research Libraries," Library Journal. 116 (No. 1, January 1991): 59-62.

Fleury, Bruce E. "Lectures, Textbooks, and the College Librarian," Improving College & University Teaching. 32 (Spring 1984): 104-105.

Hughes, Carol. "Opening a University-Wide Dialogue About Electronic Information Resources," College & Research Libraries News. (No. 2, February 1991): 84-88.

Landrum, Margaret Cozine. "Marketing Library Services to Faclty," Colorado Libraries. 13 (September 1987): 15-16.

McClure, Charles. Paper Given at Coalition of Networked Information, Washington, D.C. 1991.

Stoan, Stephen K. "Research and Information Retrieval Among Academic Researchers: Implications for Library Instruction," Library Trends. 39 (No. 3, Winter 1991): 138-257.

## Additional Sources on Librarian/Faculty Liaison

ACRL. Scholars and Librarians: Partners in Learning an Research: A Symposium. ALA Conference, 1981.

Allen, David Y. "Students Need Help in Learning How to Use the Library," Chronicle of Higher Education. 24 (June 9, 1982): 56.

Allen, Kenneth W. "Student and Faculty Attitudes," Library College Journal. 3 (Fall 1970): 28-36.

Baker, Betsy. "Bibliographic Instruction: Building the Librarian-Faculty Partnership," Reference Librarian. No. 24 (1989): 311-328.

Battin, Patricia. "The Library: Center of the Restructured University," College and Research Libraries. (May 1984).

Beth, Ann and Evan I. Farber. "Lessons from DIALOG: Technology Impacts Teaching/Learning," Library Journal. 117 (No. 15, September 15, 1992): 26-30.

Bodi, Sonia. "Collaborating with Faculty in Teaching Critical Thinking: The Role of Libraries," Research Strategies. 10 (No. 2, Spring 1992): 69-76.

Breivik, Patricia Senn. "Politics for Closing the Gap," Reference Librarian. 24 (1989): 5-16.

Broadbent, E. "A Study of Humanities Faculty Library Information Seeking Behavior," Cataloging & Classification Quarterly. 6 (No. 3, 1986): 23-37.

Brown, Charles D. "Libs.com.: An Electronic Research Tool," National Forum. 72 (No. 3, Summer 1992): 45.

Bruffe, Kenneth A. "Collaborative Learning and the Conversation of Mankind,"' College English. 46 No. 7, 1984): 638.

Bruffe, Kenneth A. "Collaborative Learning: Some Practical Models," College English. 34 (No. 5, 1973): 634-643.

Carlson, David and Ruth H. Miller. "Librarians and Teaching Faculty: Partners in Bibliographic Instruction," College and Research Libraries. 45 (November 1984): 486.

Carlson, William L. "The Liberal Arts College in the Information Age: An Appropriate Response to Information Technology," CAUSE/EFFECT. 11 (Fall 1988): 52.

Cheny, Lynne V. Humanities in America: A Report to the President, the Congress, and the American People. Washington, D.C., National Endowment for the Humanities, September 1988. 57 p.

Clark, Katharine E. and Joni Gomeg. "Faculty Use of Databases at Texas A&M University," RQ. 30 (Winter 1990): 241-248.

Commission on the Humanities. The Humanities in American Life Report of the Commission on the Humanities. Berkeley, University of California Press, 1980. 192 p.

Creth, Sheila D. "Information Technology: Building a Framework for Change," Library Issues: Briefings for Faculty and Administrators. 12 (No. 6, July 1992): 1-2, 4.

Dain, P. "Scholarship, Higher Education and Libraries in the United States: Historical Questions and Quests," in Libraries and Scholarly Communication in the United States. Ed. P. Dain and J.Y. Cole. Beta Phi Mu Monograph, No. 2. New York, Greenwood Press, 1990.

Davis, H. Scott and Marsha Miller. "Travelling LUIS: Promoting Online Catalog Dial-Access," Technical Services Quarterly. 5 (No. 3, 1988): 27-41.

Davis, Jennie Y. and Stella Bentley. "Factors Affecting Faculty Perceptions of Academic Libraries," College and Research Libraries. (November 1979): 531.

DeLoughry, Thomas J. "Professors are Urged to Devise Strategies to Help Students Deal with 'Information Explosion' Spurred by Technology," Chronicle of Higher Education. (March 8, 1989): A15.

Dickinson, Donald C. "In the Balance: A Guide to the Guides: Literary Maps of the Humanities, Social Sciences, and Sciences," Choice. (November 1983): 383-393.

Dodson, Melanie. "Faculty Access to RLIN at New York University: RLG's Research Access Project," C&RL News. (No. 8, September 1988): 522-523.

Dudley, M. "Teachers and Librarians: Partners in Library Instruction," Catholic Library World. 52 (July 1980): 17-21.

Fabian, B. "Libraries and Humanistic Scholarship," Journal of Librarianship. 18 (No. 2, 1986): 79-92.

Fister, Barbara. "Teaching Research as a Social Act: Collaborative Learning and the Library," RQ. (Summer 1990): 506.

Ford, J.E. "Natural Alliance Between Library and English Teachers in Course-Related Library Use Instruction," College and Research Libraries. 43 (September 1982): 379-384, and 44 (January 1983): 79.

Furedy, Christine and John J. Furedy. "Critical Thinking: Toward Research and Dialogue," in Using Research to Improve Teaching. Ed. J.G. Donald and A.M. Sullivan. (New Directions for Teaching and Learning, No. 23,). San Francisco, Jossey-Bass, 1985, pp. 41-69.

Gabelnick, F., et al. Learning Communities: Creating Connections Among Students, Faculty, and Disciplines. (New Directions for Teaching and Learning). San Francisco, California, Jossey-Bass, 1990.

Genaway, David C. and Edward B. Stanford. "Quasi-Departmental Libraries," College and Research Libraries. (May 1977): 190-191.

Gould, Constance. Information Needs in the Humanities: An Assessment. Pub. for the Program for Research Information Management by the Research Libraries Group, Inc., 1988.

Gould, Constance C. and Mark Handler. Information Needs in the Social Sciences: An Assessment Program for Research. Mountain View, California, Information Management, Research Libraries Group, Inc., 1989. 56 p.

Gover, Harvey R. Keys to Library Research on the Graduate Level: A Guide to Guides. Washington, D.C., University Press of America, 1981. 65 p.

Greene, Robert J. "The Effectiveness of Browsing," College and Research Libraries. (July 1977): 316.

Grover, Robert and Martha L. Hale. "The Role of the Librarian in Faculty Research," College and Research Libraries. 49 (January 1988): 9-15.

Hacker, Andrew. "The Decline of Higher Learning," The New York Review of Books. 33 (No. 2, February 13, 1986): 35-42.

Hardesty, Larry. Faculty and the Library: The Undergraduate Experience. Norwood, New Jersey, Ablex, 1991. 170 p.

Hardesty, Larry. "The Role of the Classroom Faculty in Bibliographic Instruction," in Teaching Librarians to Teach: On-the-Job Training for Bibliographic Instruction Librarians. Ed. Alice S. Clark and Kay F. Jones. Metuchen, New Jersey, Scarecrow, 1986.

Hernon, Peter and Sara Lou Williams. "University Faculty and Federal Documents: Use Patterns," Government Publications Review. (1976): 98, 103.

Hine, Betsy N., Janet Meek, and Ruth H. Miller. "Bibliographic Instruction for the Adult Student in an Academic Library," Journal of Continuing Higher Education. 37 (Spring 1989): 20-24.

Hoffman, Lucinda A. "Educate the Educator: A Possible Solution to an Academic Librarian's Dilemma," Journal of Academic Librarianship. 7 (July 1981): 161-163.

Huston, Mary M. "Research in a Rotating Librarian/Faculty Program," C&RL News. 46 (No. 1, January 1985): 13-14.

Huston, Mary M. and Frank Motley. "Faculty Membership for the Librarians: The Evergreen State College Model," in Options for the 80s. Ed. Robert D. Stueart. Proceedings of the ACRL's Second National Conference. Minneapolis, Minnesota, October 1-4, 1981. Chicago, American Library Association, 1981. p. 413-419.

Jacobsen, Trudi E. and John R. Valley. "A Half-Built Bridge: The Unfinished Work of Bibliographic Instruction," Journal of Academic Librarianship. 17 (No. 6, 1992): 359-363.

Jaros, Joe and Candace R. Benfiel. "Taming the Purple Monster: Analyzing Faculty Responses to an Informational Brochure," C&RL News. (No. 9, October 1990): 842-843.

Johnson, David W. and Roger T. Johnson. Learning Together and Alone: Cooperative, Competitive, and Individualist Learning. Englewood Cliffs, New Jersey, Prentice-Hall, 1991.

Kenney, Donald J. "Publishing BI Articles in Discipline Journals: Humanities," Research Strategies. 1 (Spring 1983): 64.

Kenney, Donald J. "Publishing BI Articles in Discipline Journals: Social Sciences," Research Strategies. 2 (Summer 1984): 128-135.

King, Kenneth M. "Letter from Kenneth M. King: Some Cheerful Thoughts" [on slow progress in realizing the potential of technology in education], EDUCOM Review. 27 (No. 5, September/October 1992): 56.

Knowles, Malcolm S. The Adult Learner: A Neglected Species. Houston, Gulf Publishing, 1984.

Kornegay, Becky. "Library Literature in Non-Library Publications," C&RL News. 51 (December 1990): 1033.

Langenberg, Donald N. "Supporting the Global Scholar," Academic Computing. (January 1989): 12-13.

Lewontin, Amy. "Providing Online Services to End Users Outside the Library," C&RL News. (No. 1, January 1991): 21-22.

Lindgren, Jon. "The Idea of Evidence in Library Instruction," RQ. 23 (Summer 1983): 339-342.

Lipow, Anne Grodzins. "Teaching the Faculty to Use the Library," in New Horizons for Academic Libraries. Saur Verlag, 1979. p. 262-267.

Lipow, Anne Grodzins. "Teach Online Catalog Users the MARC Format? Are You Kidding?" Journal of Academic Librarianship. 17 (No. 2, May 1991): 80-85.

Lougee, Wendy P., Mark Sandler, and Linda L. Parker. "The Humanistic Scholars Project: A Study of Attitudes and Behavior Concerning Collection Storage and Technology," College and Research Libraries. 51 (May 1990): 231-240.

Lowry, Anita and Junko Stuveras, comp. Scholarship in the Electronic Age - A Selective Bibliography on Research and Communications in the Humanities and Social Sciences. Washington, D.C., Council of Library Resources, 1987. 54 p.

McCaghy, Dawn and Gary R. Purcell. "Faculty Use of Government Publications," College and Research Libraries. (January 1972) 9

McCart, Carol and others. Learning Styles Among Established Professionals. Paper Presented at the Annual Meting of the American Educational Research Association. (69th, Chicago, Illinois, March 31-April 4, 1985). Ed 261086.

McCarthy, Constance. "The Faculty Problem" Journal of Academic Librarianship. 11 (July 1985): 142-145.

McInnis, Raymond G. New Perspectives for Reference Service in Academic Libraries. Westport, CT, Greenwood, 1978.

Madland, Denise. "Library Instruction for Graduate Students," College Teaching. 33 (Fall 1985): 163-164.

Minnich, Elizabeth. Transforming Knowledge. Philadelphia, PA, Temple University Press, 1990.

Moffett, William A. "Talking to Ourselves," College and Research Libraries. 50 (November 1989): 609.

Moore, May M. "Library-Use Deficiencies at the College Level: Status and Possible Causes," Michigan Academician. 21 (Spring 1989): 163-173.

Moran, Barbara B. "Library/Classroom Partnerships for the 1990s," C&RL News. 51 (June 1990): 511-514.

Morton, Herbert C. and Anne Jamison Price. "The ACLS Survey of Scholars: Views on Publications, Computers, Libraries," Scholarly Communication. (No. 5, Summer 1986): 1-15.

Murphy, Marcy. "Measuring Library Effectiveness: A Prelude to Change," Special Libraries. (January 1979): 20.

Nelson, Jerold. "Faculty Awareness and Attitudes Toward Academic Library Reference Services: A Measure of Communication," College and Research Libraries. (September 1973): 274.

Patterson, Betsey. "People First, Technology Second: Introducing Faculty to Computer Technologies," Library Software Review. 10 (September/October 1991): 347-349.

Pearson, Lennart. "Curriculum-Integrated Library Instruction," Liberal Education. 66 (Winter 1980): 402-409.

Pikoff, Howard. "Improving Access to New Interdisciplinary Materials," Library Resources and Technical Services," 35 (April 1991): 141-147.

Robinson-Shade, Barbara, ed. Culture, Style and the Educative Process.

Rogers, Sharon J. and Charlene S. Hurt. "Guest Editorial: How Scholarly Communication Should Work in the Twenty-First Century," College and Research Libraries. 51 (No. 1, January 1990): 5-10.

Schmersahl, Carmen B. "Teaching Library Research: Process Not Product," Journal of Teaching Writing. 6 (Fall-Winter 1987): 232-233.

Schrage, Michael. Shared Minds: The New Technologies of Collaboration. New York, Random House, 1990. 225 p.

Schumacher, Mark. "Teaching Tough Stuff: Instructing the Academic Search Service User: The Faculty Connection," Research Strategies. 7 (Winter 1989): 33-36.

Smalley, Topsy N. and Stephen H. Plum. "Teaching Library Researching in the Humanities and the Sciences: A Contextual Approach," in Theories of Bibliographic Education: Designs for Teaching. Ed. Cerise Oberman and Katina Strauch. New York, Bowker, 1982. p. 135-170.

Smith, Barbara J. "The State of Library User Instruction in Colleges and Universities in the United States," Peabody Journal of Education. 58 (October 1980): 15-21.

Smith, D.J. "An Examination of Higher Education: A View from the College Library," Journal of Academic Librarianship. 15 (July 1989): 144.

Somerville, Arleen N. "Information Services to the Academic Scientific Community in the 1980s," Reference Librarian. (No. 16, Winter 1986): 125-139.

Steffan, Susan Swords. "Faculty as End-Users: Strategies, Challenges, and Rewards," in Bibliographic Instruction and Computer Database Searching: Papers Presented at the Fourteenth Annual Library Instruction Conference Held at Eastern Michigan University. May 8 & 9, 1986. Ed. Teresa B. Menschin. Ann Arbor, Michigan, Pierian Press, 1988.

Steig, Margaret F. "The Information Needs of Historians," College and Research Libraries. 42 (November 1981): 549-560.

Steig, Margaret F. "Information Science and the Humanities: The Odd Couple," Library Journal. (October 1, 1987): 37-40.

Stenstrom, Patrician and Ruth B. McBride. "Serial Use by Social Science Faculty: A Survey," College and Research Libraries. (September 1979): 428-430.

Stoan, Stephen K. "Humanities Scholars: Information Needs and Uses," Journal of Documentation. 38 (No. 4, 1982): 292-313.

Stoan, Stephen K. "Research and Library Skills: An Analysis and Interpretation," College and Research Libraries. (March 1984): 99.

"Teaching and Technology: The Impact of Unlimited Information Access on Classroom Teaching," Library Issues. 9 (July 1989): 3-4.

Teuton, Luella Bosman. "Merchandising Library Services," C&RL News. (No. 3, March 1989): 208-209.

Thomas, Joy and Pat Ensor. "The University Faculty and Library Instruction," RQ. 24 (Summer 1984): 431-437.

Tiefel, Virginia. "Libraries and Librarians as Depicted in Freshman English Textbooks," College English. 44 (September 1982): 494-505.

Todd, Frankie. "Developing Teaching Skills for Collaborative Learning," Studies in Higher Education. 6 (No. 1, 1981): 91-96.

Tuckett, Harold W. and Judith Pryor. "Research Strategy for Political Science," Research Strategies. 1 (Summer 1983): 128-130.

Vincent, C.P. "Bibliographic Instruction in the Humanities: The Need to Stress Imagination," Research Strategies. 2 (No. 4, 1984): 179-184.

Watkins, Beverly T. "Information Technology: Many Campuses Start Building Tomorrow's Electronic Library," Chronicle of Higher Education. (September 22, 1992): A.

Weigand, W.A. "Research Libraries, the Ideology of Reading, and Scholarly Communication, 1976-1900," in Libraries and Scholarly Communication in the United States. Ed. P. Dain and J.Y. Coles. Beta Phi Mu Monograph, No. 2. New York, Greenwood Press, 1990.

Weintraub, K. H. "The Humanistic Scholar and the Library," Library Quarterly. 50 (No. 1, 1980): 22-39.

Weiskel, Timothy C. "University Libraries, Integrated Scholarly Information Systems (ISIS), and the Changing Character of Academic Research," Library Hi-Tech. 6 (No. 4, 1988): 7-27.

Werking, Richard Hume and Barbara J. Ford. "From the Users: Faculty Introduce New Faculty to Library Services," Research Strategies. 7 (Spring 1989): 52-60.

Werrell, Emily L. and Threasa L. Wesley. "Promoting Information Literacy Through a Faculty Workshop," Research Strategies. 8 (Fall 1990): 172-180.

Whipple, William R. "Collaborative Learning: Recognizing It When We See It," AAHE Bulletin. 40 (October 2, 1987): 3-7.

Wiberly, Stephen E., Jr. and William G. Jones. "Patterns of Information Seeking in the Humanities," College and Research Libraries. 50 (November 1989): 638-645.

Wilson, David L. "Information Technology: Huge Computer Network Quickens Pace of Academic Exchange and Collaboration," Chronicle of Higher Education. (September 30, 1992): A17-A19.

Woodsworth, Anne and others. "The Model Research Library: Planning for the Future," Journal of Academic Librarianship. (July 1989): 132-138.

# The Electronic Library : Virtually a Reality?

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# The Electronic Library : Vitually a Reality?

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## Abstract

In September 1991 De Montfort University opened a new campus in Milton Keynes, a new high-technology city eighty kilometres to the south of the University's home campus in Leicester. It was clear from the start that the technological environment and financial climate in which the campus is being established, are fundamentally different from when other new university campuses were established twenty years ago.

The whole campus including its library and information services is being developed accordingly to a business plan based on the income generated by student growth. There is no large capital grant from central government. At the same time developments in information technology and electronic publishing offer the prospect of a radically different type of academic information service.

The University at Milton Keynes has therefore set itself the goal of developing an Electronic Library within five years. The concept is a teaching, learning and study environment in which information is held primarily in electronic form. It is closely linked to and will require the co-operation of the publishing and bookselling industries.

A research programme code-named ELINOR has been set up with funding from IBM, the British Library and De Montfort University.

Initially there will be a two year pilot project to evaluate the use of document image processing technology involving the scanning of books, journals and course materials into an image bank. The project will have research results touching on a wide range of fields including library science, user studies, educational technology, image bank design, and electronic publishing to name but a few.

# The Electronic Library : Virtually a Reality?

The ponderous pun in the title of this paper poses two questions:

*What do we mean by the virtual library and the electronic library?*

and

*How near to it are we, whatever it is?*

Both terms **electronic library** and **virtual library** have been current for some time and appear to be used rather indiscriminately or interchangeably. There may be a received definition among future casters, but there does not seem to be a generally accepted distinction in the literature. We should therefore address the question of what are the ground rules to which we are working in developing the library of the future. The following are suggested:

1. Computers have unlimited potential to store and retrieve information. (There may be a philosophical limit, but to all intents and purposes the potential seems unlimited for the foreseeable future.)
2. Telecommunications have unlimited potential to interconnect organizations and transfer information.
3. The publishing industry will be totally electronic from production to distribution.
4. For academic information purposes the book will, eventually, become solely of antiquarian or aesthetic interest.

If one does not accept these basic tenets then one is not facing reality.

If there is a distinction between the terms **virtual library** and **electronic library** then reading of the literature suggests something along the following lines:

The **Virtual** Library implies a universality of access by: anyone from anywhere.[1] Running through this theme is also the idea of illusion: the searcher may think he/she is retrieving information from a local source but in fact it is flowing imperceptibly and instantaneously from all the corners of the world. The virtual library is therefore about access and its enabling mechanisms are the global communications infrastructure and metadatabases.

The **Electronic** Library implies that what we now recognize as a physically identifiable library has been taken to its ultimate form: a resource area comprising space, people and facilities but where there may not be a book in sight. The electronic library may therefore be a stepping stone to the virtual library or a component of it.

A considerable amount of innovative work on the electronic library concept is being carried out in various projects around the world. One would highlight for instance the Mercury project at Carnegie Mellon[2] and the Bellcore project.[3] The overall impression, however, is of pockets of activity without a great deal of integration or co-operative activity which takes the library world beyond the current state of the art which can be categorized as highly automated book collections. There are many factors which will tend to inhibit the development of the electronic library, for example copyright control, vested interests in publishing and a general reluctance to question the centrality of printed books to the academic process.

The purpose of this paper is to describe plans and developments in the electronic library concept at De Montfort University (formerly Leicester Polytechnic), not in any sense to hold up the project as a model (for it is only in an embryonic phase) but to show how one university in the United Kingdom is responding to the major challenges facing higher education in Britain and how library development is seen as fundamental and crucial to the success of the University in meeting its goals in a highly competitive environment.

## De Montfort University Context

To understand the context one needs to know that in a recent white paper the UK Government revealed that it intends to double the numbers of students in Higher Education over the next decade. A strategy in meeting that goal is that the former polytechnics and the established universities will be merged into a single funding system in which both types of institutions are entitled to use the title of university. It is also clear that the efficiency gains made in the former polytechnic sector over the last few years will be expected from the established university sector and that overall pressure on funding will continue to result in a reduced unit of resource for the newly merged sector as a whole.

It is in this context that De Montfort University has a substantial growth plan which will enable it to play a full part in meeting the government's targets for the sector. The growth of the university will be achieved in a dual strategy, firstly by expanding student numbers within existing programmes and by developing cognate programmes and secondly by expanding geographically into new locations by new capital developments and by a series of amalgamations with other colleges, which will also allow the university to grow into completely new discipline areas.

Against this background De Montfort University opened a new green field campus at Milton Keynes in September 1991. From cutting the first turf to welcoming the first students in the newly erected and equipped buildings a period of merely nine months elapsed. It was clear in making plans to develop the library and information services for the new campus that traditional thinking on the time and resources needed to develop a new university library ab initio would need to be radically challenged.

Within the next year four colleges will amalgamate with De Montfort University, one of which is in Leicester itself, two of which are in Lincoln and the other in Bedford. The number of operational campuses of the university will grow from three to at least ten, spread over a distance north to south of approximately 160 kilometres. The electronic library concept for the new University must therefore embrace a robust and powerful network environment to cater for delivery of information and learning resources over a wide area.

## Concept and Aims

The concept of the electronic library at De Montfort University is a teaching, learning and study environment for higher education in which information is held primarily in electronic form.[4] It is important to note that it is not a passive resource to which students will refer for information but closely linked with the teaching and learning process as new methods become current, such as student centred and open learning, computer assisted learning, distance learning and multi-media systems.

## Aim and Objectives of the Electronic Library Project

The project aim is to develop a fully electronic library environment within five years. Within this period, if not before, the information required by students and staff will be delivered primarily in electronic form or by electronic communication systems. Where there is an over-riding practical or educational reason for preferring documents, there will of course be exceptions but even then the documents will be sourced in electronic form in the system.

The objectives of the project are as follows:

1. To develop/procure/design appropriate workstations, networks, storage and retrieval systems and software.
2. To make agreements with copyright owners.
3. To develop systems for import of information from publishers.
4. To develop monitoring, and, as appropriate, charging mechanisms.
5. To research user needs, satisfaction and outcomes.
6. To design courses and materials around this concept.
7. To research the educational implications.

It is envisaged that the project will provide insights and outcomes across a wide range of research areas including:

1. Image processing and retrieval
2. Multi-media education
3. Text retrieval and indexing
4. Human/machine interface
5. Data exchange and standards
6. Pedagogic development
7. Library science
8. Higher education economics
9. Electronic publishing

The project has been adopted into the strategic plan of De Montfort University and receives substantial internal funding. Additionally the project is generously funded by the IBM UK Scientific Centre, which also assists with advice and expertise, and the British Library Research and Development Department.

## Work so far

The first full-time researcher to be appointed to the project commenced work on 1st March 1992 with two others joining later. The project is in its early stages but work so far can be divided into four main categories.

## 1. Defining the Requirements from the Electronic Library

In summary the overall requirement is to design and implement a system which will receive, store and retrieve material in electronic form. Material includes books, journals, abstracts, course notes, lectures, overheads, photographs and diagrams.

Features are to be included in the electronic library which will:

1. Accommodate material in character encoded or image format
2. Allow copyright control and monitoring
3. Allow charging by usage
4. Be manageable by non-specialists
5. Provide sophisticated text retrieval
6. Provide OCR
7. Provide a range of printing options
8. Provide a range of security features
9. Provide display facilities that are friendly to users and resemble a reading environment
10. Provide acceptable image display resolution
11. Provide facilities to enhance images
12. Integrate with other facilities, e.g. OPAC, e:mail, CD-ROM network.

## 2. Defining the pilot system

The pilot project will design and implement a small scale system to test out the concepts and ideas described above. One course at Milton Keynes, the Business Information Systems course involving 130 students has been selected. The pilot will make use as far as possible of software available on the market. The requirement is to combine software for document processing, text retrieval, database management, scanning, and copyright control. A promising area for investigation is the software known generically as Document Image Processing (DIP) systems. A DIP system which can provide the greatest level of functionality and integration will be of great interest to the project.

## 3. Specification and procurement of DIP system

The next part of the work was to define the required hardware and software configuration and survey the market. The choice of system is to a certain extent influenced by equipment in place consisting of multiple PCs (486, 4mb RAM. 40mb HD) for user enquiry stations and IBM RISC 6000 for the image server. PCs are required to work under Windows 3 and the RISC machine under AIX 3.

A detailed checklist was drawn up to cover the supply of a Document Image Processing system, complete with OCR/ICR, text retrieval and image enhancement capability. Equipment includes multiple optical disk management, scanner, high speed laser printer, high resolution colour monitors, and image processing and compression cards.

The procurement process has been an extended learning process which has involved considerable interaction with various suppliers. As far as is known no commercial integrated DIP system has yet been applied to the electronic library concept. The project has identified some useful categorization of DIP systems as applied to library problems particularly in the context of page sequencing: as follows

a) imaging + DBMS

This approach implies three related assumptions. Firstly, most of the documents are in image format. Secondly, textual information is highly structured and with limited length. Thirdly, it is not necessary to insert images into the structured text but append them as a block or folder, i.e. there is only one link between textual block and image block. This also means that the images have their own logical sequence independent from that of the text. Thus, this approach can provide means to browse through the images according to the logical sequence.

b) imaging + full-text retrieval

This approach also implies three assumptions. Firstly, most documents are in text format. Secondly, textual information is free in structure (i.e. free-text) and unlimited in length (i.e. full-text). Thirdly, images can be inserted into anywhere in the free-text, i.e. there are many links between the text and images. This also means that the images do not have their own logical sequence but text+images has. In other words, images should be browsed together with text in order to see the logical meaning of the document.

c) imaging+DBMS+full-text retrieval

A small number of imaging systems are capable of linking to both DBMS and full-text retrieval software. Users can select to link to either or even both of them. At least one we have investigated can be integrated with a relational DBMS and full-text retrieval simultaneously. However, images are not inserted into the text but kept in one folder attached to the text. Thus the logical sequence of image pages is still retained. On the whole, this system is very similar to the approach described in (a) but has the advantage of free/full-text support.

d) database independent imaging systems

A small number of imaging systems claim to be database independent. It is possible that such systems will work in a similar way as category (c) once they are linked to a DBMS or full-text retrieval system.

### 4. Negotiations with publishers

It was recognized from the start that co-operation from publishers would be vital to the success of the pilot. It was envisaged that publishers would be very cautious about such a development. At the same time it was hoped that individual publishers would be sufficiently intrigued by the project to take part in its learning process provided that adequate protection on copyright is given. Happily this has proved to be the case and to date a dozen publishers have given permission to scan over fifty works which are prescribed reading for the Business Information Systems course. All the publishers involved have expressed keenness to gain intelligence on usage and methodologies from the project.

## Conclusion

In conclusion we return to the question posed at the beginning of this paper: How near are we to the electronic library?

Let us dispose of the easy bits of the forecast. The technology should all be in place by the turn of the century as we can tell from presently discernible trends.[5] High speed, high bandwidth communications and electronic books at the right size, resolution, contrast ratios and colour capabilities to allow you to read them in bed will be available. So if it is information that is required, rather than the pleasure of handling a creamy paged, well designed volume, the book will soon commence its gradual fading into obsolescence.

It is not the technology that will impede the emergence of the electronic library so what therefore needs to happen?

1. Publishers will come to terms with electrocopying.
2. Publishers will agree formal or de facto standards for the sourcing of text and images.
3. Librarians will come to terms with the reconfiguring and restructuring of academic and other libraries which are not based on print on paper.
4. Librarians and their host organizations will need to invest in the communications infrastructure to become a delivery mechanism of the restructured publishing industry.

It is always risky to predict when things will happen but if, even if, it takes twenty years for these changes to shake out in the book world, what is twenty years in the history of libraries? On that timescale it will happen tomorrow or the next day. So the answer to our question - is the electronic library virtually a reality? - is YES.

## References

1. Harley, A. J: Towards the virtual library: The nationwide provision and use of information: ASLIB/115/LA Joint Conference, Sheffield, 1980. pp 163-166
2. Arms, William Y. et al: The Mercury electronic library and information system, the first three years: Carnegie Mellon University. Mercury technical reports series no.6 1992
3. Lesk, Michael: The CORE electronic chemistry library: Proceedings of the ACM Special Group on information retrieval conference, Chicago, 1991
4. Arnold, K., Collier, M., Ramsden, A.: Elinor: the Electronic Library project at De Montfort University, Milton Keynes. Aslib Proceedings 45(1) Jan 1993
5. Kurzweil, R.: The future of libraries: pt 2: the end of books. Library Journal. February 15th, 1992 pp 140-141.

# The New Roles of Librarians in the Electronic Library : Organizational and Functional Changes in a Swedish University Library

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# The New Roles of Librarians in the Electronic Library : Organizational and Functional Changes in a Swedish University Library

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## Abstract

The implementation of an integrated library system often starts a change of the organization within the library. The integrated functions of the system (cataloguing, acquisition, circulation and serials) make it necessary to develop the co-operation between the library departments and functions. The new tools, the local library system, PCs, terminals, networks, CD-ROMs, etc., will put demands on the professionalism of the librarian. The role of the librarian will be that of a subject expertise as well as that of a generalist.

# The New Roles of Librarians in the Electronic Library : Organizational and Functional Changes in a Swedish University Library

When planning for, or trying to predict the future of the library and the roles librarians will play, there are three factors to consider: the organization of the library, the technology available and the human factor - the library staff. By looking at the last 20 years we will see how these factors have influenced the development of a Swedish university library.

## The 70s

### Technology

If I look back at the Swedish academic libraries, and especially the Uppsala University Library, by the beginning of the 70s, it was by that time the computer was introduced into the library. The library then became a part of the Central System, LIBRIS (**LIBR**ary **I**nformation **S**ystem), a system for shared cataloguing and for producing catalogue cards. For that purpose a terminal was installed at the cataloguing department.

The Central System, LIBRIS, was at the beginning planned to "automate" and take care of all library routines, not only cataloguing, but also, as an integrated system, to include acquisition, serials control and circulation.

### Organization

The organization of the library was a centralized organization, with library resources centralized to one central library. The library departments developed routines and manual registers within their department walls. The work-flow was divided into small parts, to each of the staff to be responsible for, in the aim of a more efficient production.

### Librarian

The role of the librarian during the 70s became that of specialists of certain routines and sometimes even perfectionists within their special field. These special competencies were seldom used by other library departments and the relationship between the library departments was a more competitive than a co-operative one, esp. between the public services and the other departments. Only those librarians serving in the public services were in contact with the users.

At the beginning of the 70s, only some of the library staff had academic degrees and only few of them had a degree in academic librarianship. The Swedish School of Library Science didn't include a degree for academic librarians until 1974. Before that academic libraries arranged their own in-house training.

## The 80s

### Technology

In 1982 it was decided that the Central System, LIBRIS, should develop centralized routines, like cataloguing and interlibrary loan, including the National Bibliography and the Union Catalogue. Other, local routines had to be developed by each library.[1] This was the start for the academic libraries to find their own local library systems, based on mini- and microcomputers.

The then chosen local systems were more of house-keeping systems than IR-systems, with the purposes of automating the library catalogue to users within the campus. The availability of the system was mainly to the local users communicating within the local network.

CD-ROM was starting to replace printed bibliographies and online searching.

### Organization

Before and besides the process of purchasing a local system, a lot of efforts were made on evaluating the library organization and to reorganize parts, or even the whole library structure. The purpose of the automation was to use less or, at least, the same number of staff providing more and better services. At Uppsala University Library from 1983 to 1989, when the local system was installed, 17 organizational reports, concerning parts as well as the total organization of the library, were published. One of these reports put a new dimension to the library organization. Instead of analyzing it department by department, it was more interested in the functions within the library, the selection and acquisition, the organization and control and the provision of services.[2]

A process of decentralizing the library services started by building branch libraries. The branch librarian should be responsible for all functions in the library, within a certain range of subjects. Then, a co-ordinator of the local policies within each function, for example in cataloguing, acquisition and circulation, became necessary.[3]

The organizational changes, concentrated on the functionality, were applicable to the modules in an integrated system. For example, during the implementation of the Uppsala University Library System, the EDP Project initiated an investigation of the circulation department organization. The investigation was made by a special working group, with members from different departments. In their report they suggested a more flexible organization, a system where librarians are serving both at public services as well as at "inner" services, giving the staff possibilities for a variation in tasks, both intellectual and mechanical.[4]

### Librarian

The library systems management has shown a need for a system organization with librarians responsible for each system module, functioning both as contact persons to the system manager as well as to each other. These librarians are also responsible for training and co-ordinating the use of the system. For example, during a retrospective project, emanating from books on loan, both cataloguing and circulation staff need to co-operate.

## The Future

### Technology

With the installation of the local systems a snowball has started rolling. At Uppsala University Library, with a staff of 250, each of them will in the nearest future have a PC of their own with connections not only to the local system computer, but, via INTERNET, to all other national and international databases and network services. The local PC-network could also be used for local applications and programming.

### Organization

So far we have been mostly occupied with the functions within the library and how to solve our internal organizational problems. For the future we will see a virtual library, in the sense of co-operation and resource sharing between libraries and librarians.

Librarian

The competencies of the librarians have changed and developed due to:

- more librarians with a degree in librarianship;
- in-house training programmes, esp. when introducing a local library system;
- organizations with functional co-ordination.

The new roles of the librarians in the electronic library will be:

- mediator between the users and the sources of information
- innovator in information technology.

## References

1. Noerr, Peter L.: LIBRIS - Development Evaluation. 1982 (DFI-publication, ISSN 0349-9324 ; 1982:7 E)

2. Lindh, Agneta: MBI-utredningen vid Uppsala universitetsbibliotek = [MB] Investigation at Uppsala University Library] . Uppsala 1985-09-02

3. Organisationsöversynen vid Uppsala universitetsbibliotek = [Revision of the Organisation of Uppsala University Library]. Uppsala 1986-06-04

4. Delförslag [rörande organisationen av låneavdelningen] från organisationsgruppen = [Proposition Concerning the Organization of the Circulation Department by the Working Group for Organization]. Uppsala. 1989-11-15

# *The* British Library : Towards the Millennium

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## Abstract

**The British Library is in the process of drawing up a new Strategic Plan to take it forward to the year 2000. Informed by the study report *Information UK 2000* and by a programme of consultation with the community, key objectives are being identified to develop the services users will need in the future. An important component of the strategy to deliver better services will be the new British Library building at St Pancras in London, while at the same time networking of increasingly electronic information will be applied to serve the remote user. Yet this must be achieved against a probable background of continuing financial constraint, requiring difficult choices and more co-operation both nationally and internationally.**

# *The* British Library : Towards the Millennium

## Introduction

The British Library is preparing a strategic plan to take it forward to the Year 2000. Besides the advent of the new century, the significance of this plan is that it encompasses the first half decade in the Library's new building at St Pancras in London. The St Pancras Building will provide the most modern facilities which it is intended will be reflected in a much improved quality of service.

A programme of consultation with the UK community will begin shortly. *British Library News* will invite individuals and institutions to comment, and contributions from overseas institutions would be welcome. If you would like to obtain a copy of the consultation document, you should contact the Press & Public Relations Office of the British Library, who will send you a copy as soon as it is ready.

This paper will give a preview of what the Strategic Plan will contain, but reflecting the theme of this symposium - the electronic library - it will concentrate on the Library's technological vision.

## Services of the British Library

First, for those that are not familiar with the British Library, it may be helpful to summarize its services. Being the national library of the United Kingdom it is the repository for the national archive of British publications. The Library and its predecessor institutions have collected widely from all corners of the globe for over 250 years building collections of incredible richness. These include over 15 million books, 33 million patent specifications, 8 million stamps, 2 million maps, 900,000 sound recordings and 600,000 volumes of newspapers.

Reference access to the collections is provided through a number of reading rooms, and 1.75 million items are consulted each year.

Normal reader services are supplemented by commercial information services covering business, medicine, the environment, science and technology.

The BLAISE-LINE on-line information retrieval service allows remote users to search a range of bibliographic databases covering 10 million records including the catalogues of the British Library.

Internationally the Library is perhaps best known for its Document Supply Centre which satisfies nearly 95% of the 3.3 million requests it receives each year for photocopies and loans of journal articles, technical reports and books.

Through its printed and machine-readable bibliographic products the National Bibliographic Service supports key activities in libraries such as book selection, acquisition and cataloguing.

The British Library can therefore justly claim to be a national library of major international stature.

## The Information Environment

In drawing up its Strategic Plan the Library had to be aware of the environment in which it would have to operate. There are several aspects to the environment: social, economic, political and technological. The implications of these factors for the information environment were the subject of a study commissioned by the British Library Research & Development Department called *Information UK 2000*.

The panels of experts brought together for the study did not foretell the death of the book, nor did they make science fiction-like predictions of new technologies, saying instead that the technologies that will predominate by the Year 2000 are known today.

They preferred to extrapolate current evolutionary trends to make forecasts that personal workstations will be on many more desks at work and at home. Indeed work and home may be more and more interchangeable as "teleworking" becomes more commonplace. The coverage of networks will be more widespread, and they will have greater bandwidth. This will encourage users increasingly to seek access to information services from their desks rather than walking or travelling to their libraries. Electronic publishing, while not replacing book publishing, will become the medium for certain classes of information. And users will expect documents, both full-text and images, to be delivered electronically direct to their desks.

It was against this background that the British Library began planning its services up to the turn of the century.

## The British Library Strategic Plan

The first step was to redefine the Library's mission. I shall not recite the mission statement here, but what the British Library aims to be is encapsulated in its positioning statement which now appears on all its printed material, namely "the world's leading resource for scholarship, research and innovation".

The most important plank in the Library's plans is to improve its user orientation. It is recognized that much greater market research will be required if - as the title of the symposium implies - we are to understand and serve our users in an increasingly electronic library. What's more we have to anticipate the needs of future generations of users in the material we collect today.

While the new building at St Pancras presents a major opportunity to improve services, the British Library will still be a two site library, and the Strategic Plan will also emphasize the development of services from its Boston Spa campus in Yorkshire. Following a major programme of relocation from London there are now five directorates in the north, where just two years ago there was only one - the Document Supply Centre. It has now been joined by the National Bibliographic Service, Computing & Telecommunications, Acquisitions, Processing & Cataloguing and Administration. Increasingly collections less used for reference purposes will be housed at Boston Spa. A key thrust is to manage the two sites from the user's point of view as a single library with a single collection.

While the focus for reference use will be London, and the focus for remote use will be Boston Spa, a guiding principle will be that users should have access to all services irrespective of location wherever practicable. Electronic publications and information services will be accessible over the existing wide area network connecting the sites, and a fast fax service will deliver copies of journal articles from one site to another. Clearly books at one site required for consultation at the other will have to be requested the day before, and for rare or fragile items the user will still have to travel to the book, unless a digitised surrogate is available and will suffice.

There will be a renewed commitment to building the collections and their preservation. Over the last decade there has been a rapid decline in the Library's acquisitions and preservation effort, owing to the failure of government funding to keep pace with inflation and the need to fund much of the preparative work for the move into St Pancras out of the recurrent grant. Attempts to reverse this decline are to be given priority. However, to be realistic the British Library will at the same time have to make more efficient use of its funds by forging partnerships with libraries in the UK and abroad to share the responsibility for collecting in some subject or language areas.

## Automation Strategy

Critical to the realization of its key thrusts is the application of automation. Although the Strategic Plan will say a lot about the services that will be delivered electronically, a separate Automation Strategy document, to be published in the summer of 1993, will map the systems required to support these services. The Library has, however, already decided its Information Technology Infrastructure Policy.

Open systems hardware will be mandatory in all specifications. This implies the UNIX operating system. INGRES has been chosen as the relational database management system, and BRS Search will be the information and text retrieval engine.

Because in many cases the British Library will be serving the public, interfaces will have to be very user-friendly. Graphical user interfaces will be the norm with an emphasis on menu selection.

Networking is regarded as especially important for reaching a wider audience and as a channel for co-operation. For this reason the Search & Retrieve protocol will be applied wherever practical to allow users to search British Library databases from their own systems using their familiar search dialogue.

For some years the Library has had a system of local area networks within directorates linked together by means of a wide area network spanning nearly all sites in London and Yorkshire. This is the vehicle for office automation and also for the transmission of data and documents between sites in response to users' requests. Electronic mail is expanding rapidly within the Library, and is now beginning to be used for communication over networks like the Joint Academic Network (JANET) in the UK and INTERNET in the United States. A sophisticated voice network based on distributed switches provides direct dialing inwards to any individual member of staff whether in Boston Spa or London. The next step is to provide videoconferencing to cut down on the travelling between sites that has been a tedious and expensive necessity for many managers.

## Automated Catalogues

The first system to be constructed in accordance with the IT Infrastructure Policy is the new British Library OPAC (on-line public access catalogue), which is nearing completion ready for the opening of the first phase of the St Pancras building. Initially the OPAC will cover only those catalogues for the services to be housed in the first phase: Sciences, Humanities and Music, including the huge 3.5 million records of the British Library Catalogue built up over 250 years, which has been recently retrospectively converted. Other special collections catalogues will be added as the services move in. The Document Supply Centre catalogues will also be covered in due course to make its collections more accessible and to promote the single collection principle.

The OPAC will use client-server architecture. A specially adapted version of Microsoft Windows running on IBM-compatible microcomputers will provide the interface. There will be 150 of these in the first phase growing to 450 by the completion phase. The database server running BRS Search will be situated 200 miles away in Boston Spa, connected by duplicated land lines which follow different routes into the sites to ensure the telecommunications are fail-safe. In between will be a local server in London running the readers database on INGRES and taking some of the load of the database server.

The OPAC will interface with the Readers Admission System and the Automated Book Request System. When they register with the Library, readers will be issued with an identity card with a magnetic stripe entitling them to either restricted access (general collections only) or unrestricted access (including rare and valuable items). This card will allow them through the automatic gates that separate the public areas, like the exhibition galleries, from the reading rooms. Readers will insert their cards in the OPAC terminals and conduct their searches. Requesting the books they would like to see is simply a matter of pressing a button. A picking list is printed out in the appropriate store and the Mechanical Book Handling System delivers the book within minutes to the information desk in the reading room where the reader is situated.

In order to raise awareness and encourage use of the collections the OPAC will be networked. Connection to the UK Joint Academic Network (JANET) is likely to be made in the next year.

An important concept to be developed in the Strategic Plan is that of the "single gateway". The intention is that readers and remote users alike will be able through the OPAC to access not only all the services of the British Library including electronic documents, but also a wide variety of other library catalogues and commercial database and information services. The single gateway will enable the British Library to develop fully its role both as a receiver and provider of information.

## Electronic Text

A lot of that information will be increasingly in the form of electronic text. A key thrust of the Library's strategy is to become a major world centre for the storage of, and access to, digital texts which are required for research and scholarship. For reasons of copyright the British Library does not intend to digitise large volumes of recent paper documents itself other than for transmission between sites. The emphasis instead will be on acquiring electronic publications or digitised collections. An important plank in this policy will be convincing the UK Government of the need to extend its legal deposit legislation to cover electronic and audio-visual publications. In the meantime acquisition will be by purchase and by encouraging voluntary deposit by publishers.

Electronic document delivery of digitised text or fax images will become an increasingly important way by which the Document Supply Centre will serve its customers. The speed of implementation and pricing of integrated digital networks (ISDNs) in the UK has been disappointing, and predictions made in the mid-nineteen eighties of large volumes of requests now being satisfied by electronic document delivery proved unfounded. However, the imminent advent of high speed academic networks, like the US National Research & Education Network (NREN) and SuperJANET in the UK, is set to change that. Already the Document Supply Centre is experimenting with Nottingham University to gain experience for an operational service.

One area where the Library expects to digitise significant volumes of documents is for preservation. However, the sheer scale of the problem of creating electronic surrogates is such that it will almost certainly have to form a part of a co-operative programme with partners in the public and private sectors. Indeed consideration will be given to setting up a joint Archiving and Conservation Centre whereby the British Library and other national libraries, museums and archival institutions can pool costs and expertise in archiving digital material which it is important to keep.

An exciting field that can be expected to mature during the 1990s is multimedia. It offers the opportunity to make the riches of the Library's collections accessible to a much wider audience. Several multi-media exhibits are under development for the galleries of St Pancras, and other products are being sponsored for the education market. We expect to publish many more multi-media products once there is a clear standard and there is a significant installed base of players in schools, colleges and homes. A case is being prepared for government funding of a mediatheque on land at the back of the St Pancras site of the type pioneered at the Pompidou Centre in Paris and at the Library of Congress in Washington.

## Resources

But how are the resources going to be found for all these visions, especially in view of the difficult financial position of the British Library? Indeed why plan at all when there has been so much uncertainty and attrition over government funding of the Library over recent years? The answer is that only if the British Library has a vision of its future can it persuade government of the value of the Library to the community and thereby achieve some stability in its funding.

The investment cost has been estimated at £10m. Spread over the next seven years it is not such a vast sum, and once the move into St Pancras has been achieved, one drain on finances will be plugged and money set aside for the transitional costs can be ploughed into new services. But the task will still be difficult necessitating a number of parallel measures.

One step is to examine current activities with the services it is hoped to offer in the future. Prioritisation will allow rational decisions to be taken about what we can afford to stop doing in the interest of developing better services.

There will be increased emphasis on introducing revenue-earning services to increase this proportion of its total income, which already stands at 30%.

The commitment to restore collections and preservation to their former levels does not necessarily mean reinstating the full amount of the money spent in the past. By careful management the same quality can be achieved but at lower cost. For instance wherever possible the principle of a single copy collection will be applied. Thus one copy of a book will serve both reference and document supply functions. As a further measure acquisitions will be more selective.

Partnership with major research libraries, other national libraries and public libraries will be sought to share responsibility for acquisitions, cataloguing, retention and preservation. It is through such partnerships that the Library will demonstrate leadership in co-ordinating national and even international provision, so that economy and effectiveness can be achieved for all participants.

Indeed the realisation that libraries must co-operate to survive and face the future is a dominant theme in the Plan, and the British Library will be seeking strategic alliances over the coming years with private sector partners for investment in new technologically based services and with key public sector institutions in the UK and abroad. Of particular significance is Britain's bridging role between North America and Europe, which is reflected in the Library's involvement with the two major bibliographic utilities in the United States and the new Consortium of European Research Libraries. This should be especially fruitful for collaborative machine-readable cataloguing projects.

## Conclusion

That concludes this brief preview of the British Library's Strategic Plan. To summarize the key thrusts are to:

- create a single library operating on two sites;
- restore the quality of its acquisition, preservation and research programmes;
- invest in networking and technology to support the services of the future;
- become a world centre for the capture, storage and delivery of electronic text;
- demonstrate leadership in the development of co-operative programmes.

Underpinning these thrusts is the intention to be much more customer oriented, and effort will be put into surveys and focus groups for example. Development will be service-driven, reflecting a true understanding of what the customer needs.

And, starting out as it hopes to go on, the Library will shortly be launching its programme of consultation. The feedback received will help the Library shape its strategy. If you have any comments they would be most welcome.

## Reference

*Information UK 2000.* The British Library Research & Development Department. Edited by Martyn, J, Vickers, P and Feeney, M. Bowker Saur, 1990.

# From Microforms to Imaging : Document Storage in Transition

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# From Microforms to Imaging : Document Storage in Transition

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## Abstract

**Imaging technology and progress toward network implementation of OSI and the Linked System Protocol NISO Z39.50 hold promise for improving collection development, document storage and resource sharing. The stability of these technological developments are examined in light of earlier efforts such as micrographics. The impact of new technology on libraries is examined, with projections for the future.**

# From Microforms to Imaging : Document Storage in Transition

## Introduction

One would imagine that, being in the information age, the role of the librarian would become more important as society recognized the need for information.

Instead, one of the biggest challenges facing librarians is to become integrated into the information industry as a competitive player, so that librarians do not remain, as our honored guest Herbert White recently wrote "bit players and spear carriers to the script of others."[1]

In examining the impact of technology on libraries, Richard Dougherty, at last year's Symposium, talked of a "paradigm shift."[2] He indicated that technology is creating a new societal environment that will present society and its institutions with a host of challenges. The shift that is becoming all too obvious is a change from one of librarians wielding technological tools, to technologists pretending to be librarians. Some librarians are also succumbing to the spell of technology, trying to automate everything. This phenomena has been labeled "technophoria". "The term is being used to describe a blind belief in the beneficial effects of technology and the identification of technology as a panacea for all kinds of problems."[3]

This situation may well fit what Abraham Kaplan described as the law of the Instrument. It goes: "Give a little boy a hammer, and everything he encounters needs pounding."[4] As access to information becomes the function of technological hammers, the person wielding the tool will do the pounding. A column in the October 5, 1992 issue of Network World put it this way: "If the only tools they sell are hammers, all of your problems may look like nails."[5] Finally, a cognitive programming tool called "case-based reasoning", reminds us of a childhood experience where "the kid who owns the football gets to make the rules."

The phenomena underlying this discussion, is that librarians are being slowly, and almost imperceptibly, cut out of the information mainstream. The philosophical foundations of librarianship are being undermined by a technological thrust which has as much potential to cause harm, as good.

The sad thing is that librarians may be unwittingly contributing to the situation. In our efforts to find technological alternatives to the printed document, librarians are turning document control over to businesses who better understand what document management is all about.

Without library controls, the push toward a "virtual library" will result in virtually no library. What makes the issue so complex is the symbiotic relationship librarians have enjoyed with books. It is difficult to separate out the role of the information provider, from that of the caretaker. Will librarianship die out with the book?

To some extent, I agree with Bernard Gallivan, who presented a paper at the 1991 Symposium on "Full Text Imperatives for the National Library of Scotland."[6] He said, "libraries are in the information business. Libraries are not museums for books. Few books are special as objects, and the most important feature of a book is what it says, not what it looks like."

At the same time, books and other paper document constitute the only bargaining chip we have to play in the information game. In our efforts to serve users, we sometimes forget what universal bibliographic control could really mean, with the bulk of the world's literature stored in libraries. If this literature was scanned into electronic form, accessible directly to users, would we need librarians?

We all know what a fickle bunch users are. As we heard on Monday, if they cannot find information, they pretend they don't need it. They blame the library for information problems, as though we publish the books and price the journals. At the same time, they are quite satisfied with the results of their own searches, poor as they may be.

The next ten years will not see a radical change in what we now know as the library. The "virtual library", as far as users are concerned, will become more of a reality. However, the physical plant will continue to exist due to the large document collections which are housed there. Optical and magnetic media will store the bulk of the most requested documents. Or will the documents stored on optical media be the ones that are most requested?

## The Future

Let us imagine what the scenario might be twenty years from now. The world's literature has been converted to electronic images. Those paper documents deemed worthy, reside in archives, with access more difficult than we now have to the dead sea scrolls. Publishing has become a free market. Anyone can input electronic documents, now called message sets, into national databases. There is a slight charge for publishing, with an equitable reward system, based on demand for the information. Artificial intelligence recognizes whether the contribution is sufficiently original to be accepted, thus weeding out undue duplication.

An algorithm, based on requests for information, determines how long these message sets will stay active. While an author could place repeated requests for his/her document, in order to keep it "active", they are charged for each request. The system may even key on the author's identification number, to prevent them from using national databases as personal filing systems. After a specified time, unrequested documents will be automatically archived, similar to current mainframe operations. Indexes will indicate the existence of these items, with an extra charge to reload into the primary system. After a specified period, archived documents will be stripped of their knowledge content, and the original purged. The data is integrated into a human archive, akin to what Manfred Kochen described as tutorial information systems.[7]

National databases are linked together electronically, with almost instantaneous communications. Language translation is a macro feature that is initiated as a default by the country code from which the request came. Naturally, default overrides are possible.

Access to the data will be from the home, from pocket computers, or from conveniently placed devices in public areas.

Requesters have expert system capabilities for emulating search procedures of information specialists, thus libraries will have to compete for customers based on value-added features of their service. Using hypermedia, users will be able to create images synthesized from a variety of sources. Plagiarism will be minimized by the computer's ability to recognize someone else's work, a system already used for text documents in some universities. The model could probably be more complex, since publishers will not relinquish control as easily as librarians, but the models work best if kept simple.

## Document Storage Solutions

For the time-being, the paper document collection serves as the mainstay of the library. In fact, many libraries measure their worth by the size of their collection. Estimates are that 80% of a librarian's time is spent on the housekeeping of documents. Thus one of the biggest administrative headaches is document management.

In 1944, even before the information explosion, Fremont Rider suggested that storage was the most important hidden cost factor associated with library collections.[8] His thesis was greeted with some ridicule, perhaps because the hidden agenda was his strong interest in microphotography. Escalating costs and overstocked collections may well rekindle Rider's views.

A number of methods for optimizing storage space have been proposed. Solutions include shelving by size, compact shelving, warehousing, and weeding.

Technology has always been instrumental in efforts to reduce size of collections, and subsequently physical space. For some reason, improvements in the storage of documents connotate commensurate improvements in information retrieval. For example, H. G. Wells' concept of the World Brain, proposed in 1937, was stimulated by the potential of microfilm in reducing recorded knowledge to a manageable size. Fremont Rider's solution to document storage was microcards, and in 1945 Vannevar Bush saw computers as a technological solution to information retrieval.[9] Numerous other visions appear in the literature. New technologies have a way of garnering disciples.

## The New Technology

Technological advances have been rapid. Computer sizes and storage capacities are a good example. Consider the power of notebook computers, or the size of palmtop computers, such as one from Hewlett Packard (HP). For a retail price of $699, you can purchase an 11 ounce computer that measures 3 inches by 6 inches. The unit comes with 512KB of RAM, and Lotus 1-2-3 in ROM. It has built-in data communications and a serial port. The display is 16 lines by 40, and the keyboard adds a numeric keypad to the QWERTY layout. HP also sells a one and one-third inch disk drive that can hold 21.4MB. With flash memory, sizes and weights will come down even more, limited only by our ability to see the display and our fingers to hit the keyboard. With image projection and voice input, even these dimensions can be reduced.

Storage capacities have increased to the point that we are looking for new words to describe incredibly high possibilities. The U.S. navy has kindly supplied us with one. Bronto, derived from Brontosaurus, stands for 10 to the 21st power bytes. Consider, that only a few years ago, megabytes were at the top end for microcomputer storage. Today, a single juke box can store 12 or more terabytes, enough for over a million monographs.

## Microforms and Imaging

When did technology first offer the opportunity for reducing documents? After the printing, the first real technological hope for miniaturizing documents was microfilm. Public discussion of micropublishing dates from 1853, although it did not begin until the mid 1930s. Its potential for library applications was never fulfilled.

With the possible exception of Computer Output Microfilm for library catalogs, libraries relegated microfilm to passive applications, such as document preservation. Library microform applications for document management failed for a number of reasons: 1. Micropublishing never seriously challenged book publishing; 2. poor equipment and lack of standards hampered development; 3. users did not have home equipment and were not sociologically conditioned; and 4. librarians were not attuned to spending large amounts of money on equipment, and did not market the technology well to users.

With improvements in optical character recognition and mass-storage technology, librarians are awakening to another technological opportunity for solving the storage problem. The solution is document imaging.

Imaging itself is not a new technology, having been used in the health fields, and various business applications, for several years. However, digital scanning and development of Intelligent Character Recognition (ICR) made it possible to recognize unconventional typography, thereby lending itself to a wide variety of record formats.

Imaging consists of scanning print documents for conversion into exact electronic equivalents, complete with graphics. Projections are that electronic imaging will rapidly outpace micrographics. By 1994, imaging will be over a 12 billion dollar industry.

Digital imaging provides the ultimate document storage compaction by reducing paper documents to the size of electrons. Information in an electronic state achieves the highest level of abstraction, and may mirror the manner in which the human mind assimilates knowledge. As such, electronic documents are the hopes from which artificial intelligence dreams are made of.

On the negative side, imaging technology has not stabilized. Standards are still evolving, and the characteristics of electronic documents or access to them are not completely understood. As a technical example, consider the properties of text and graphics.

Resolution is measured by the number of pixels per inch (ppi). If you assign 1-bit per pixel (bpp), called binary, the character can be reproduced in black or white. To reproduce 10-point text, about the size in most journals, 150 ppi would be sufficient. To read 6-point text, or graphics, would require 300 ppi.

With graphics, such as pictures, the grey scale or color, adds considerably to the storage requirements. To show sufficient contrast, eight bpp would allow for 256 shades of grey, or color.

Top-end imaging programs can assign as many as 32 bpp. More popular programs allow for 24-bit grey scale, approximately 16.7 million colors. Six to eight bpp, if scanned at sufficient resolution, can faithfully reproduce a photograph. Despite the human limitation of discerning only 62,000 colors, 24-bit grey scale is recommended to ensure true color images. To illustrate, an 8x10 color picture can easily require 1 megabyte (MB) of storage. An VGA screen display with 24-bit images could exceed 4 MB.

Image compression can save considerable storage space, but no standards determine which is best for a particular picture.

Bernard GalliVan's paper, to which I referred earlier, is a good source for a wealth of data on applying imaging to document storage in a large library.

From a document storage viewpoint, imaging paper documents would allow the originals to be discarded. However, once documents are in electronic form, they cannot be read by the naked eye. If something happens to the electronic media, the documents are lost forever. One also needs to question the archival quality of optical and magnetic media, the legality of electronic images, and user acceptance. Guards against vandalism would require encryption, which might be hard to decipher over time, as might the media formats.

The point of the discussion regarding technical aspects of document scanning, is that libraries have such a broad range of materials, that no single scanning solution may be found.

To argue that imaging is superior to microfilming is like comparing apples and oranges. Both technologies have inherent strengths and weaknesses, and actually offer solutions to different sorts of document-related problems.

Digital imaging works best when a document is first created, allowing rapid, remote, and concurrent access. The word I believe is collocation. Micrographics are suited for retrospective applications, when the longevity of a document has been determined. Thus, imaging can support the more active information retrieval functions of a library, whereas micrographics is still the best solution for the preservation functions. A recent article in Library Journal called for the total abandonment of microfilm preservation projects, in favor of electronic document imaging.[10] The shortsightedness of this viewpoint is hard to imagine.

As Gallivan and others point out, microforms can still play an important role until imaging matures, and electronic publishing becomes prevalent. With microfilm, high resolution and color of the originals can be maintained at a fraction of the cost, and scanned later if warranted, or as costs come down. One recent cost estimate is that 1000 images on film cost $.94, while 1000 images on optical disk cost $11.53.

Actually, it is cheaper to microfilm first, and then scan the film, than it is to scan the source document. Service bureau costs for 16 mm microfilming and then scanning the film can range between 4 cents and 7 cents per image. Costs for scanning of the paper document directly, range between 7 cents and 15 cents per image.

Equipment is available that simultaneously microfilms and scans. For example, the Kodak Imagelink is rated to scan between 90 and 120 documents per minute, has built-in compression, networking capability, and a number of other features.

Perhaps the best, and as yet un-realized advantage of electronic documents, is the potential they hold for resource sharing. With projected decreases in transmission time, and true interoperability between computer networks, the electronic book will always be available for circulation. Systems are already in place for integrating data and images, and making them available to a wide variety of users.

At Carnegie Mellon University Library, Project Mercury allows users to search indexes linked to imaged document databases, as well as CD-

ROM and bibliographic databases, with networked delivery to their computer.[11] RLG is marketing ARIEL, a PC-based software package for transmission of high-quality images. LC's American Memory Project has also received a great deal of attention.[12] Numerous other projects are underway, worldwide. Before wholesale imaging occurs, these pilot projects need to be coordinated and networked.

## Networking Standards

Libraries have worked extensively on the problem of achieving open computing through interoperability of disparate systems. It may be worthwhile to examine current developments in the United States in order to see if network developments can support the resource sharing function.

In America, the most notable effort to link libraries, and ultimately users, has been the Linked System Project (LSP).[13] Begun to facilitate resource sharing between the Library of Congress and bibliographic utilities, the LSP holds the promise of providing a uniform procedure so that all users have the same means of accessing a variety of information sources.

Started in 1980, the initial application of the LSP was to maintain a National Authority file jointly built by LC and cooperative libraries, under what was called NACO (National Coordinated Cataloging Operations). LSP is currently growing beyond this initial implementation, to encompass bibliographic records and to link together additional systems.

To support the NACO program through LSP, it is necessary for the participating systems to implement intersystem searching through an LSP facility known as Information Retrieval. With LSP protocols and applications implemented locally, a system can exchange records with heterogeneous systems in computer-to-computer mode. The LSP information retrieval protocol became NISO standard Z39.50 in 1988. Z39.50 was not compatible with the ISO standards. This problem was corrected in 1992 with Z39.50 version 2. In order to allow for more flexibility, about 30 institutions are working to advance the standard to version 3. A list is available from NISO, but to name a few: MIT, NOTIS, DIALOG, APPLE, Chemical Abstracts, OCLC, and RLG. AT&T is working on an image transfer component. Penn State and UCLA recently demonstrated ineroperability using Z39.50. LC is very close to having an implementation.[14]

In order to make it easier for other systems to exchange records and searches, the LSP applications are being migrated to Internet protocols. Internet is the largest computer network linking U.S. educational institutions, and holds the most promise for library interoperability. There are approximately 3,000 networks hooked to the backbone, with 3,000,000 users around the world.

Internet is seen as forming the basis for a national network called NREN (National Research and Education Network). Five years from now, NREN is expected to have a transmission rate of a billion bits per second, hooking computers with a scalable performance up to a trillion operations per second (teraop machines). This capability will provide the high speed communications needed for image transfer.[15]

OCLC, in an August, 1992 white paper outlining its linking strategy for Internet and NREN, envisions a large migration of libraries to Internet.[16] Between 1992 and 1995, OCLC will provide batch-file transfer of MARC records over Internet, and explore new options resulting from development of NREN.

Internet runs under a communication protocol called TCP/IP, which is not directly compatible with the file transfer protocol for OSI, the international standard. For the next five years or so, most vendor activity will be in the Internet environment. As more affordable and better OSI products come on the market, interest in OSI will increase. Presently, visions for the future are somewhat speculative. It is difficult to predict if the distance between technological developments, and resulting software and standards development will ever narrow.

In the short term, say the next ten years, imaging and electronic resource sharing will play a positive role in meeting the needs of libraries. The electronic, nearly paperless library, may finally become a reality, if librarians can obtain the funding. With the promise of electronic imaging and high-speed networking, document storage will shift from managing paper documents to electronic ones. Libraries will gradually convert their usable stock to electronic form, and provide users direct computer access. As electronic publishing prospers, libraries will add fewer documents to their collection, and serve more as gateways to large data banks.

## Future of Libraries

What impact will the decrease in reliance on local document collections have on the role the library plays in the information retrieval chain?

Although standards for most electronic documents have yet to be developed, predictions are that within ten years cataloging as we know it today will cease to exist. The physical facility, now called a "library" will no longer be needed as centralized electronic systems send documents directly to the user. Even the terms "document" and "electronic library" will become anomalies.

Whatever the future holds, librarians may not be a part of it. Few professions undermine their user base as much as librarians. Does the real estate agent urge homeowners to sell their own homes? Does the lawyer teach the potential client how to argue a case? Does the doctor try to teach the patient how to diagnose an illness? Why do librarians persist in convincing end users that the search process is easy? Librarians are fostering the myth that users can search as effectively as a professional. We need to develop a client-server system, similar to other professions, so that librarians become integral components of future information systems. Another option is perhaps to develop proprietary access systems, that is, control the gateways.

Librarians are too secure in their market niche, little realizing that the provision of information is a competitive business. Other information agencies are constantly seeking to strengthen their hold or expand their markets. For example, Reeds International and Elsevier have recently agreed to a merger, creating the world's largest publishing and information group. Reeds already owns Bowker and Cahners. Librarians complain about the escalating costs of journal subscriptions. Who is naive enough to think they will get better with electronic media? We teach users about CD-ROM. CD-ROM drives are the best selling peripheral after a basic configuration. Home-based database CDs will become as cheap as music CDs with mass distribution. People will buy whether they need it or not and feel secure, thinking they no longer need the library, somewhat like purchasing insurance for information disasters. Can you imagine a CD-database of the month club?

What will happen to library support when these publishers consider the home market? Institutional support for libraries can quickly erode. Even now, a number of danger signs are in place for the disintegration of the library as an institution: For example, the

1. Vendors marketing to end users;
2. Merging of academic library and computer center administration;

3. Good reputation but low perceived need;
4. Replacement of professional library positions with technical assistants, or professionals with allegiance to other areas.
5. Increasing demand on libraries for accountability coupled with decreased financial support. Over half the school libraries in California have been closed in the past ten years.
6. Higher expectations from users. The very scholars long-supported by academic libraries are becoming its biggest critics. They forget that libraries buy books, not publish them.
7. and, an alarming rate of closings in American library schools in recent years, with little or no support from the very agency which accredits them.

Whether we consider libraries to be warehouses or information retrieval centers, the public's faith and support in the institution of librarianship must be maintained. Users should be politically and socially motivated through subliminal marketing. Potential users should think of the library first and be made to feel guilty if they don't. Couldn't an organization, such as the American Library Association, adopt marketing strategies of other advocacy groups. For example, the NRA (National Rifle Association) is one of the best-funded and most powerful lobbying groups in the U.S. It thrives on the basic fear of people with the slogan "If you forbid citizens to bear firearms, only criminals will have guns." This works quite well. The McDonald's Hamburger corporation has thoroughly indoctrinated our youth and even adults are becoming convinced that eating a greasy re-constituted hamburger is good for them.

Couldn't we think of a library slogan like "If you take away libraries, only criminals will have information?"

At this time, ALA appears to be promoting reading more than libraries. ALA reaches librarians with promotional literature, and we only reach users, who happen to be a minority of the population. The non-users may be the ones who grow up to be provosts and presidents. How about an ALA children's club membership or family plans? I'm sure you can think of other ways. The visibility, the buying power, and the part libraries fulfill in the educational process should be used to develop strategies through what is known in businesses as "bootstrapping." The term refers to survival tactics which can be the critical difference in a competitive market. While not necessarily unethical, bootstrapping techniques may not fit the current image of library operations. I think one library example of bootstrapping referred to yesterday was entrepreneurship.

Fortunately, and hopefully in time, there is a growing awareness of the threat to libraries. Even more importantly, specific steps are being recommended. Last year's Symposium participants were given some advice from Maurice Line.[17]

Some of these were:

1. Cultivate influential users (as in game theory); or as Richard Dougherty discussed, exploit stakeholder inter-dependency, and Sheila Corall's matrix approach for organizational structure, as well as Barbara von Wahlde's cooperative alliances networking; (see current issue)
2. Design your whole system round users and their needs;
3. Don't always react, proact; and
4. Build up a demand ... where users demand extra resources.

Dr. Malinconico, in a recent article titled "What Librarians Need to Know To Survive in an age of Technology" envisions a scenario in which there may be competition between librarians and others for control and management of basic information resources and for the right to deliver information services.[18] He makes some recommendations on how library education curricula can prepare librarians for working with other competitive groups. His viewpoint is similar to the one that Professor Lancaster shared with last year's and this year's Symposium participants, namely, the solution is not to take on the responsibility of teaching things that rightfully belong in computer science departments.[19] Rather, Malinconico stresses that library schools should teach how to:

1. Articulate goals, objectives, and requirements to non-librarians;
2. Work with group processes and function within bureaucracies;
3. Understand the capabilities and limitations of information-handling technologies;
4. Understand that the fundamental activity of librarianship is management; and
5. Aggressive promoting and marketing of library services.

Unfortunately, he does not tell us how library schools can survive in order to teach all of the above.

The keynote address at the LITA conference in Dallas on September 13, 1992 suggested that librarians no longer be information resource managers, but rather, presidents of invisible colleges whose job is to raise money and create enabling infrastructures. The speaker also emphasized that there is too much attention paid to the management of information, and not enough to the management of relationships.[20] Action may be forthcoming!

An entry in the September 1992 issue of the Journal of Academic Librarianship, titled "Visions: Taking Control of Our Destiny" documents a grassroots movement born through E-mail on the Internet.[21] Librarians were concerned with the threat to their roles in the information arena, resulting from the maturing of computer technology.

Initiated by Susan Martin, and funded by the Council on Library Resources and six library vendors, the "Strategic Visions Steering Committee" was formed in December 1991. As one result, the Palmer School of Library and Information Studies has asked for help in restructuring its curriculum that would more appropriately educate students for a future role in a more proactive library community. The Committee's agenda for the future provides other possible steps that can be taken.

## Conclusion

What then of imaging? Imaging may be the best solution to the document storage problem, but if done hurriedly, it may be the technology which consumes us.

Librarians should continue to experiment with scanning, but until technical, business and political problems are solved, control of the world's literature must be maintained. If books are as unimportant as some librarians hold, let them rot on the shelves (the books, not the librarians). They will at least contribute to the visibility of the library. Once administrative control is assured, wholesale access to electronic documents will contribute to the purposes for which libraries were established.

While not advocating militant action, librarians must work toward being mandated and protected by law, like affirmative action programs, rather than dictated by the vagaries of user practice.

I am not a Luddite, nor a technophoric. Having grown up in a main-frame environment, there was little need to know about the mechanics of computing. If there was a problem, system analysts and operations would take care of it. In same ways microcomputing is a step backward unless we are lucky enough to have a system integrator on staff. Now we need to know some technical stuff as well as the applications, sort of like learning to tune and repair your own car. There is also a danger that random, uncoordinated activities can occur with independent systems, thus fragmenting rather than building cooperation.

Automation has been good for libraries, but as the means for recording knowledge change, so too must libraries decide what their true purposes are. If we believe in what librarianship stands for, we must use technological and social tools to ensure our future. In the process of solving immediate problems, such as storage, will we burn our bridges?

## References

1. White, Herbert S. "Hewers of Wood and Drawers of Water", Library Journal 116, (17, October 15, 1991), pp. 52-53.
2. Dougherty, Richard, "Nudging a Dinosaur in Order to Avoid Library Extinction", in Libraries and Electronic Publishing : promises and challenges for the 90's; 14th International Essen Symposium, 14 Oct. - 17 Oct. 1991. Festschrift in honour of Richard Dougherty, edited by Ahmed H. Helal and Joachim W. Weiß, Essen University Library, Essen, 1992, pp. 17 - 30.
3. Saunders, Laverna A., "The Virtual Library Today", Library Administration & Management 6 (2, Spring 1992) pp. 66-70.
4. Kaplan, Abraham, The Conduct of Inquiry, San Francisco: Chandler Publishing, 1964.
5. Carlini, James "Users Should Step Carefully in Search for Net Integrator", Network World 9 (40, October 5, 1992) p. 32.
6. Gallivan, Bernard, "Full Text Imperatives for the National Library of Scotland", in Libraries and Electronic Publishing : promises and challenges for the 90's; 14th International Essen Symposium, 14 Oct. - 17 Oct. 1991. Festschrift in honour of Richard Dougherty, edited by Ahmed H. Helal and Joachim W. Weiß, Essen University Library, Essen, 1992, pp. 97 - 114.

7. Harmon, Glynn, “The World Encyclopedia Concept“, in Toward a Theory of Librarianship, edited by Conard H. Rawski, Metuchen, New Jersey: Scarecrow Press, 1973, pp. 221-231.

8. Saffady, William, Micrographics, Littleton, Colorado; Libraries Unlimited, 1978.

9. Garfield, Eugene, “World Brain or Memex? Mechanical and Intellectual Requirements for Universal Bibliographic Control“, in Essays of an Information Scientists, Philadelphia: ISI Press, 1983, pp. 540-547.

10. Billings, Harold, “The Bionic Library, Library Journal 116 (17, October 15, 1991) pp. 38-42.

11. Blair, Joan, “The Library in the Information Revolution“, Library Administration & Management 6 (2, Spring, 1992) pp. 71-76.

12. “The American Memory Project: Sharing Unique Collections Electronically“, Library Congress Information Bulletin 49 (February 26, 1990) pp. 83-87.

13. Fenly, Judith G. and Beacher Wiggings, ed. The Linked System Project: A Networking Tool for Libraries, Dublin, Ohio: OCLC, 1988.

14. Dixon, Larry, E-mail Posting, (PACS-L@LDIX.LOC.GOV), March 30, 1992.

15. “NLM Announces Grant Program for Connection to Internet“, NLM News 47 (3-4, March-April, 1992), pp. 1-2.

16. “OCLC linking Strategy: Internet and NREN“, OCLC White Paper, Dublin, Ohio: OCLC, 1992.

17. Line, Maurice B., “Conclusions and Comments“, in Libraries and Electronic Publishing : promises and challenges for the 90's; 14th International Essen Symposium, 14 Oct. - 17 Oct. 1991. Festschrift in honour of Richard Dougherty, edited by Ahmed H. Helal and Joachim W. Weiß, Essen University Library, Essen, 1992, pp. 195 - 204.

18. Malinconico, S. Michael, “What Libraries Need to Know to Survive in an age of Technology“, JALISE 33 (3, Summer 1992), pp. 226-240.

19. Lancaster, Frederick W., "Has Technology Failed Us?", in Information Technology and Library Management : 13th International Essen Symposium, 22 October - 25 October 1990; Festschrift in honour of Mragret Beckman, edited by Ahmed H. Helal and Joachim W. Weiß. Essen University Library, Essen, 1991, pp. 1 - 14.

20. "Virtual and Actual Library Future Explored at LITA", Library Hotline 21 (39, September 28, 1992), p. 1.

21. Bosseau, Don and Susan Martin, "Visions: Taking Control of Our Destiny", The Journal of Academic Librarianship 18 (4, September, 1992), pp. 230-236.

# Intelligent Gateways : Functions for the Benefit of the Electronic Library

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# Intelligent Gateways : Functions for the Benefit of the Electronic Library

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## Abstract

**Library automation enhances the processes of offering and distributing information to library users. Nevertheless, that information is still a small part of the entire information available on the information market. Therefore, users having access only to local information pools of an electronic library might miss a lot of relevant information. Intelligent gateways offer a chance to reduce this disproportion by extending the access to more information pools, reducing the access problem, reducing the problems of selection, and offering the information in a way users want. Therefore, intelligent gateways offer complementary functions to the electronic library by adding value on a substantial and functional level.**

**This paper will give an overview on the possibilities offered by intelligent gateways and will explain the way in which their functions could be integrated in the concept of the electronic library.**

# Intelligent Gateways : Functions for the Benefit of the Electronic Library

## 1.The Electronic Library - an Overview

The essential purpose of an electronic library is similar to that of libraries not yet electronified: improving the users' chance to obtain the information they need. Applying information technology within a library has three aspects:

a) optimizing the internal workflow of the library;

b) optimizing the services a library offers to other libraries and to the end user;

c) optimizing the users' access to the world of - increasingly electronic - information.

In this paper I would like to emphasize the last two points. In other words, I am going to ask how the concept of intelligent gateways can be applied for the benefit of the users of an electronic library.

These are the topics I want to address in particular:

- Users and the access to electronic information - problems and possible solutions
- Intelligent gateways - a concept to minimize the problems of gaining information
    - The problem of selection
    - The problem of searching
    - The problem of output
    - The problem of accessing documents or the information itself
    - The problem of transparency
- Intelligent gateways - an option for diversifying instead of reducing information

## 2. Users and the Access to Electronic Information - Problems and Possible Solutions

When users come to a library today seeking information we will offer them several pools to search in: the local OPAC, networked catalogues, CD-ROMs or online databases. There will be a good chance for the users to obtain references and finally the documents and the information they are looking for. Nevertheless, there are not many users who are able to manage all these steps without help from the library's staff.

Typical problems users are confronted with are:

a) How do users know what kind of information is available in the different sources they might have access to?

b) Will they be skilled enough to select the right source by themselves?

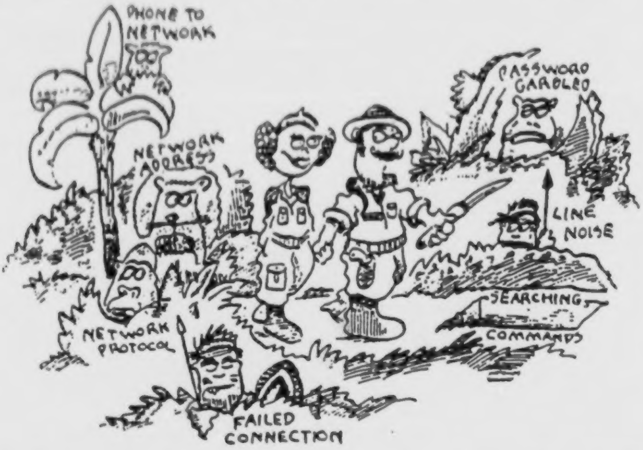
c) Do users know how to access selected databases? Do they know the conditions for using them?

d) Will the users be able to retrieve all the entire information they want? Will they be skilled enough to switch between the different conceptual and syntactical frameworks of information retrieval systems?

e) Will they be able to parametrize the systems in such a way that the information will be presented according to their special purposes or wishes, e.g. in terms of data structure, media and place?

Most of you have been confronted with these questions for a long time, too. And most of you know that we are the ones who are to assist these users. But the possibilities to assist them in managing these problems are getting worse. Not only because of reduced budgets for library staff, and because of the enlargement and diversification of user groups but also because the information being made available electronically is still increasing. And this trend will continue.

The only likely way out of this dilemma is to get help from machines. They will have to help us to solve the problems mentioned above. Their function will be to help the users manage the problems of selecting, searching, presenting and accessing information. They will take them by hand and lead them through the information jungle, as Hawkins illustrated with a picture in a paper from 1988 (Hawkins 1988:32).



More and more often the users who will come to or in most times log in the electronic library want to get rid of all those selection and retrieval problems. They should have the chance to access information pools in an easy way by getting help from the systems they use. Members of the library staff will get involved only if the clients have problems using the systems. If these gateway systems manage the problems like our colleagues do now (perhaps even better in terms of available time and accuracy) they will perform some functions which we call "intelligent". Therefore we should call those systems "intelligent gateways". Their goal will be:

> To guide the users to the information they want by offering access to (electronic) information wherever it is available and whatever the technical circumstances are.

## 3. Intelligent Gateways - a Concept to Minimize the Problems of Gaining Information

The concept of gateways - which in my understanding includes the functionality of front-end systems[1] - is sufficiently evaluated by famous colleagues like Martha Williams, Dan Prickett, Efthimis Efthimiadis, J.A. Large, James Benson and Bela Weinberg and - adding a German scholar to the enumeration - Rainer Kuhlen[2]. There are several essential functions which I do not want to list and explain in this session. Instead I want to focus on five essential problems the users have to solve when seeking information. These main moduls of - finally - intelligent gateways will be conceptual prototypes for the solution of these (and other) intelligent functions assisting the users.

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[1] Compare the arguments of Kuhlen 1991:2f who describes the complementary features of gateways and front-ends and gives explanations why "gateways" could be used as a broader term.

The five problems I want to focus on are: the problem of selection (3.1), the problem of searching (3.2), the problem of output (3.3), the problem of accessing documents or the information itself (3.4) and finally, the problem of offering transparency to the users of the system (3.5).

### 3.1 The Problem of Selection

Frances Barker called the problem of database selection "a challenge for the 1990s" (Barker 1990), explaining that the increasing diversity of the information market will increase the complexity of database selection.

Clients who just want information normally will not be interested in the complexity of the information market. They are only looking for specific information. And they will need assistance to find it. In case of database selection this means

a) different levels of information about available sources[3];

b) information about possible restrictions which could be applied to the available pools of data, e.g. in terms of economical restraints, updating, validity or language and the consequences of these restraints.

c) information about the different structure of the data available.

To avoid increasing complexity, all these options should be available in the background, activated by the users when they want to use them.

On a basic level these are functions similar to those we have today when using EasyNet, for example. But a closer look at EasyNet (or other gateway services)[4] shows us the real challenge: The more automated systems we apply the more we have to know in advance about the clients' interest. This is the only way to prepare adaptive systems for the special focus of these users.

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[2] Williams 1986; Prickett 1988; Benson et al. 1988; Efthimiadis 1990; Large 1990; Kuhlen 1991; Prickett 1991.

[3] For automating this function a numbering system for electronic products would be a great advantage; see Scharff 1991.

[4] See e.g. Bassewitz 1990 or Kelman 1988.

A lot of research has been done to implement systems like these using artificial intelligence and expert systems[5]. The available solutions work well enough as long as they are restricted to a special field and there are no changes. But on the market there are always changes. To keep pace with these seems to be the real unsolved problem.

Meanwhile most of us are trying to reduce the complexity of the information market in a simple way: we reduce the number of systems and information pools offered to the users. But this cannot be the solution in the long run because it ignores the options of diversity and competitiveness the information market offers. Thereby we run the risk of restricting instead of widening the information access and in the result perverting the idea of an electronic library.

## 3.2 The Problem of Searching

Having solved the selection problem, users will have to take the next step: searching. Users surely would like to pose their questions in natural language, and there are great improvements in offering tools to make that possible (Lange 1991; Philip et al. 1991). Until these tools work well we will offer available retrieval interfaces to the clients: menus, commands, graphical interfaces, depending on our preferences, or as we can obtain them on the market.

This shows us another aspect of intelligent gateways: They should provide interfaces which are able to lead us through all the systems and information resources the electronic library will offer. Starting a search in a local information pool, extending it to off-line databases on CD-ROM or other optical disks and finally going beyond the locally available pools - all these searches should not be restrained by switching from one search language to another or by alternating the keywords needed to retrieve information. This all has to be done by the intelligent gateway.

In other words: we have to solve a syntactical and a semantical problem. As a consequence we need to enforce options like the disconnection of

[5] Hawkins 1988; Morris et al. 1988; O'Neill et al. 1988; Vickery 1989; Weckert et al. 1992

CD-ROM retrieval interfaces from the search engine they use (Hatvany et al. 1991). Thus the biggest chance to solve the syntax problem is to apply the standard which is available now: The SR-standard (ISO 10162) or Z39.50, as the ANSI-equivalent (Lehmann 1991; Lynch 1990). Even if it takes some more time to implement these standards in most of the commercially available products we have reason to be optimistic.

Nevertheless, we have to be aware of the fact that these standards do not overcome the problem Common Command Language (CCL) has not solved. Different information providers will insist on different search possibilities and on the special search options these offer to their clients. Therefore SR or, as the case may be, Z39.50 will still match only a limited range of search possibilities. But users won't be aware of that. Therefore, intelligent gateways will have to give these bad news to the networked users of an electronic library.

In the long run the demand by networked users will perhaps surpass the demand shown by users searching database systems via direct access. This might be the only chance to extend the core command set available to the standard user of the future.

### 3.3 The Problem of Output

There are different possibilities to obtain the retrieved information from the system. Users manipulating the output face three main tasks:

a) the *selection of data*, a problem which goes beyond Boolean relationships, e.g. by checking duplications or checking output in terms of relevance, validity of data, or availability of documents;

b) the *presentation of the data*, e.g. assimilation of data structure, field tags or insertion in an output frame for the convenience of the users;

c) the choice of *output media and place*, e.g. mailed electronically, printed on paper locally or data output to a fax machine.

All these options have to be offered to the users. Therefore they have to decide where and in which way they will get the data. The intelligent gateway has to offer those options - not only by adopting features of the system being used. Again this value adding service gets its goals from the idea that the electronic library should offer options instead of restrictions to the users.

## 3.4 The Problem of Accessing Documents or the Information Itself

There have been many efforts to improve interlending procedures and document delivery during the last several years (see for an overview Osswald 1992b:16-18 and 30-34). Projects like ION (Plaister 1991) or ADONIS (Stern et al. 1988; Korwitz 1992) have been discussed in the literature and here at the Essen Symposium as well. It is a great advantage that these projects include the changes of document production and availability. Even though it will take some more time until the vision of a paperless society becomes reality (Lancaster 1982), it is a fact that we will have an increasing amount of electronically available documents. These documents (or parts of them) will be much easier to access and deliver than printed ones.

Traditionally the access to documents retrieved during a search in a catalogue, a CD-ROM or an online database is not only timeconsuming but also yields unpredictable results. This causes a great demand for better document delivery services. The vision I have is a service by which most parts of the job will be done automatically - depending on the parametrization of the system by the user. Such a modul of an intelligent gateway performing an ideal document delivery service would improve library functions in a special way.

Most probably that modul will search for holdings information which could be added to the retrieved results. In case of electronic availability of the documents the system will initiate the output of these electronic documents (or the relevant parts of them) at a place the users want[6]. In case of availability on paper the system could be linked to interlending networks which are or will be available. Documents could then be ordered for delivery or be processed on demand by a converting routine. Originally printed documents would then be available in an electronic version after scanning and - depending on the order - OCR processing (e.g. Butler et al. 1989).

The existing problems of realizing such a concept cannot be discussed in my paper but I want to remark that I am aware also of the commercial and legal problems involved (Osswald 1992b:139-149 and 204-210; Pijnenborg

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[6] See Osswald 1992a for the problems of identification of electronic documents. - Suggestions for a further standardization of the international exchange of electronic documents are given by the Group on Electronic Document Interchange (GEDI) (see GEDI 1991).

1991). Nevertheless, from a technical and procedural point of view this modul of an intelligent gateway seems to me the most likely one to come about.

### 3.5 The Problem of Transparency

The concept of intelligent gateways does not entail the users' interest in what happens inside the "black box" of the intelligent gateway. As long as the interface and the communication modul is adequate and able to lead users to the information they want, most of them will be satisfied because the system serves their needs.

On the other hand, there are users who want to understand or even control the way in which the service of the intelligent gateway is produced. These clients offer the chance for the development of a service partnership within the electronic library context.

Therefore, there has to be the opportunity for the user to use an self-explanatory modul of the intelligent gateway which explains the steps and the rules applied. For that reason the user must be able to switch between a "black box modus" and an "explanatory modus".

In my opinion this option is not only for the users' sake but also an advantage to the system designers and library experts who will have the chance to participate in the users' experiences and questions. This keeps the system open for improvements and at the same time reduces the danger of misunderstandings between the designers of the electronic library and the users.

## 4. Intelligent Gateways - an Option for Diversifying Instead of Reducing Information

Conventional gateways as we know them from the online market facilitate the access procedures by applying reduction concepts to the available options of the information market. These gateways available today offer substantial disadvantages, e.g.

a) users do not get an idea of the diversity the information market offers;

b) users are offered only a small segment of the function set being available in different information systems;

c) users do not have much influence on the output options the gateways provide.

## 5. Conclusions

Users of existing gateway services are provided with limited services and with reduced options for adding value to the data they obtain. Moreover, they pay much more for that kind of service than users who retrieve information not using the gateway service.

Instead of this reduced service, intelligent gateways will provide a wider range and better quality of services because they:

a) link the locally available resources of the electronic library with the functional and content-based options the information market provides;

b) add on complementary information to the data the system has retrieved;

c) add value to that information, e.g. by document delivery procedures;

d) do not keep users in a state of ignorance but offer a chance to overcome the know-how-barrier and get them involved in the process of retrieving and selecting information.

Intelligent gateways are the tools which offer assistance to the users seeking information. Additionally, they will allow them to keep up with the development of the information market. Therefore intelligent gateways are the right tool for the electronic library to provide a wide range of services for the benefit of its users.

## References

Barker 1990

Barker, Frances H.: Database selection - a challenge for the 1990s. - In: Oppenheim, Charles (ed.); Citroen, Charles (ed.); Griffiths, José-Marie (ed.): Perspectives in information management, Vol.2, London 1990, 29-37

Bassewitz 1990

Bassewitz, Klaus-Henning von: Gateways. Konzepte, Leistungen, Bewertungen. Universität Konstanz, FG Informationswissenschaft, Diplomarbeit, Konstanz 1990

Benson et al. 1988

Benson, James (ed.), Weinberg, Bella Hass (ed.): Gateway software and natural language interfaces: options for online searching, Ann Arbor 1988 (Library Hi Tech Special Studies Series, Number Two)

Butler et al. 1989

Butler, Brett; Goodram, Richard: Towards the electronic library: a functional model. - In: 2nd Pacific Conference on new information technology, Proceedings, May 1989, Singapore, 21-26

Efthimiadis 1990

Efthimiadis, Efthimis: Online searching aids: a review of front-ends, gateways and other interfaces. - In: Journal of Documentation 46(1990) 3, 218-262

GEDI 1991

Group on Electronic Document Interchange (GEDI): Electronic Document Delivery. Towards further standardization of international interchange, o.O October 1991

Hatvany et al. 1991

Hatvany, Bela; Hyams, Peter: CD-ROM data exchange possible next year. - In: The Electronic Library 9(1991) 3, 188-191

Hawkins 1988

Hawkins, Donald: Applications of artificial intelligence (AI) and expert systems for online searching. - In: ONLINE 12 (1988) 1, 31-43

ISO 10 162

ISO/TC46/SC4/WG4: Information and Documentation - Search and Retrieve Application. Service definition for open systems interconnection. 1992-01-22

Kelman 1988

Kelman, Gloria: EasyNet: A review. - In: Benson / Weinberg 1988, 105-108

Korwitz 1992

Korwitz, Ulrich: Electronic journals and document delivery: Chances and risks. - In: Helal, Ahmed H. (ed.); Weiss, Joachim W. (ed.): Libraries and electronic publishing: Promises and challenges for the 90's, 14th International Essen Symposium 14 October - 17 October 1991, Essen 1992, 39-54

Kuhlen 1991

Kuhlen, Rainer: Aktivierung von Online Informationsbanken aus Hypertextbasen. - In: ONLINE '91. 14. Europäische Congressmesse für Technische Kommunikation, 4.-8. Februar 1991 in Hamburg, Hamburg 1991, IV.01.01-IV.01.14

Lancaster 1982
Lancaster, Frederick W.: Libraries and librarians in an age of electronics, Arlington 1982

Lange 1991
Lange, Holley R.: The voice as computer interface: a look at tomorrow's technologies. - In: The Electronic Library 9 (1991) 1, 7-11

Large 1990
Large, J.A.: Software developments. - In: Bysouth, Peter (ed.); Aslib (ed.): End user searching. The effective gateway to published information, London 1990, 19-43

Lehmann 1991
Lehmann, Klaus-Dieter: Bibliotheksnetze und ihre Standards. - In: Zeitschrift für Bibliothekswesen und Bibliographie 39 (1992) 1, 16-24

Lynch 1990
Lynch, Clifford A.: Information Retrieval as a network application. - In: Library Hi Tech 8 (1990) 4, 57-72 (Consecutive issue 32)

Morris et al. 1988
Morris, A.; Tseng, G.; Newham, G.: The selection of online databases and hosts - an expert system approach. - In: Online Information 88, 12th International Online Information Meeting, London 6-8 December 1988, Proceedings Volume I, Oxford and New Jersey 1988, 139-148

O'Neill et al. 1988
O'Neill, M.; Morris, A.;: Database and expert systems - the way forward. - In: Online Information 88, 12th International Online Information Meeting, London 6-8 December 1988, Proceedings Volume I, Oxford and New Jersey 1988, 279-290

Osswald 1992a
Osswald, Achim: Identification of electronic documents: The diversification of document supply and its consequences for document description. - In: Helal, Ahmed H. (ed.); Weiss, Joachim W. (ed.): Libraries and electronic publishing: Promises and chal-

lenges for the 90's, 14th International Essen Symposium 14 October - 17 October 1991, Essen 1992, 83-95

Osswald 1992b

Dokumentlieferung im Zeitalter Elektronischen Publizierens. Die mediale Differenzierung öffentlich zugänglicher Dokumente als Grundlage der Flexibilisierung von Verwertungsinteressen, Konstanz 1992 (Schriften zur Informationswissenschaft; 5)

Philip et al. 1991

Philip, G.; Peters, B.F.; Smith, F.J.; Crookes, D.; Rafferty, T.: Design and evaluation of a speech interface for remote database searching. - In: Journal of Information Science 17 (1991) 21-36

Pijnenborg 1991

Pijnenborg, Mari F.: The digital library environment: political and legal implications. - In: IATUL Quarterly 5 (1991) 4, 237-244

Plaister 1991

Plaister, Jean: Project ION (OSI pilot/demonstration project between library networks in Europe for interlending services). - In: Libri 41 (1991) 4, 289-305

Prikett 1988

Prikett, Dan: Gateways. - In: Information Services & Use 8 (1988) 123-129

Prikett 1991

Prikett, Dan: Gateways and networks - new highways and traffic jams. - In: Information Services & Use 11(1991) 55-61

Scharff 1991

Scharff, Lennart: Using ISBN for electronic informations products. - In: Online Information 91. 15th International Online Information Meeting, Proceedings, London 10-12 December 1991, ed. by David Raitt, Oxford and New Jersey 1991, 307-313

Stern et al. 1988

Stern, Barrie T.; Campbell, Robert: ADONIS: the story so far. - In: Oppenheim, Charles (ed.): CD-ROM, Fundamentals to applications, London u.a. 1988, 181-219

Weckert et al. 1992

Weckert, John (ed.); McDonald, Craig (ed.): Artificial intelligence, knowledge systems and the future library. Library Hi Tech 10 (1992) 1-2 (Consecutive issue 37-38)

Williams 1986

Williams, Martha: Transparent information systems through gateways, front ends, intermediaries, and interfaces. - In: JASIS 37(1986) 4, 204-214

Vickery 1989

Vickery, Alina: Intelligent interfaces for online searching. - In: Aslib Information (1989) 11/12, 271-274

# Wide-Area Information Server (WAIS) as the Hub of an Electronic Library Service at Lund University

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# Wide-Area Information Server (WAIS) as the Hub of an Electronic Library Service at Lund University

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## Abstract

Electronic information sources are not heavily used by the faculty, university staff, researchers, and students at Lund University (and in Sweden) today while the world-wide development of these new types of resources is rapidly growing. The physical prerequisites in the form of computer networks and local personal computers with sufficiently large storage capacities is readily available and the number of electronically stored information is rapidly growing.

We have started to collect information sources within three different areas (computer science, Internet use and environmental studies). Within each area there are several different types of sources, e. g. the environment area has bibliographic information (books and periodicals), journal content pages, a local directory

database on environmental related research projects and an archive of articles from relevant electronic conferences. A seed-bank database is planned in collaboration with the Nordic Gene Bank.

The popularity of WAIS is steadily growing and there are several hundred available sources today. However, improvements need to be done with the possibilities to select sources (better/automatic indexing of databases and documents, utilizing the hypertext possibilities of World-Wide Web to build a source selection tool) and in the search and relevance-ranking algorithms.

# Wide-Area Information Server (WAIS) as the Hub of an Electronic Library Service at Lund University

## 1. Introduction

The explosive technical development in both computer communications and computer technology leads to new possibilities in utilizing information of different kinds from around the world.

Electronic information sources are badly utilized by researchers and students at Lund University (and in Sweden) today while the world-wide development of these new types of resources is rapidly growing. The physical prerequisites in the form of computer networks and local personal computers with sufficiently large storage capacities are now readily available and the number of electronic information sources is rapidly growing.

The main electronic services provided by the Lund University Library today are a mixture of local and national OPACs and CD-ROM network based databases with no integration at all (no common user interface, no common search language, different access methods, etc).

While the Internet has a lot of possibilities and resources there is a need to make these services known to researchers and students as well as providing user-friendly tools to utilize Internet. One solution is to provide "Network Information Retrieval and Publication Systems" (e.g. WAIS [Kah91,WAIS], World-Wide Web (WWW) [BLCGP92, WWW], Internet Gopher [Gop92, GOPHER], etc) for common use. We have decided to use WAIS as the base of our service. WAIS is based on a standard protocol for networked search and retrieval (Z39.50) and has also easy to use tools for indexing and publishing information databases together with good user interfaces available on a lot of different platforms.

The electronic library service at Lund has three main objectives:

- Acting as an intelligent gateway to electronic information resources on Internet.

- Building a local information server which collects and organizes electronic documents.
- Making user-friendly tools available as well as education and support for users of the electronic information sources.

## 2. Electronic Library Service at Lund University

Lund University (founded in 1666) is the largest single establishment for research and higher education in Scandinavia. It covers the areas of Technology, Science, Law, Social Sciences, Medicine, Odontology, Teacher Education, Liberal Arts, Theology, Music and Drama. At present nearly 30,000 students are enrolled including some 2,800 post-graduates. Altogether some 6,000 people are employed at the university; about half of them are teachers and researchers. The University Library, UB2, is the main library for Science, Technology and Medicine.

One of the goals with this project is to introduce and disseminate knowledge about the new distributed electronic information sources that exist today. This applies not only to WAIS but also to all other information sources available on the Internet. In order to do this we will provide the users at Lund University Library, UB2, with free access to an Internet connected UNIX workstation (SUN ELC). On this machine WAIS clients, Gopher clients, WWW clients will be readily available. Also on this machine there will be a system for collecting users' comments, suggestions and reactions on this new technology. This machine is supplemented by another machine used as WAIS-server for our local databases (see below). This second machine also runs an anonymous ftp server (named ftp.ub2.lu.se) providing all WAIS, Gopher and WWW software plus any additional software that might be of interest.

We will attempt to use WAIS to provide a uniform, user-friendly way of accessing and tapping the wealth of information available on the Internet. This will be described in more detail below in connection with the different parts of the Electronic Library Service.

Another important part is education and support for potential users of these systems. We have developed two courses, one targeted for students and researchers and one targeted for librarians. The courses introduce the concept of computer networking and give examples of what services can be found on the Internet. Information systems like

WAIS are treated in more detail and the course concludes with hands on experience in the form of a tutored session with Internet connected workstations.

Support for new users wishing to utilize these tools will be provided by some kind of helpdesk facility. We will also promote local use by making all software easily available, writing short "how to"-guides and giving demonstrations and regular courses.

## 3. What is WAIS?

WAIS stands for **W**ide **A**rea **I**nformation **S**erver, and is an architecture for a flexible distributed information retrieval system developed by Thinking Machines Corp. Cambridge, MA together with Dow Jones News and Apple Corp [Kah91]. The information in WAIS is available regardless of format (full-text, word-processing documents, images, sound, multi-media, etc) and geographical location. Today there are more than 300 information sources available through WAIS.

WAIS is based on the client/server model of computation using a standardized common computer-to-computer protocol over computer networks like Internet (figure 1). The protocol used is ANSI/NISO Z39.50-1988 Information Retrieval Protocol which is closely related to, but not compatible with, SR (Search and Retrieve ISO 10162/10163) a protocol used e.g. by a Nordic project for networking national library databases [Sko92]. Work is in progress to update the WAIS protocol to Z39.50-1992 which is a compatible superset of SR.

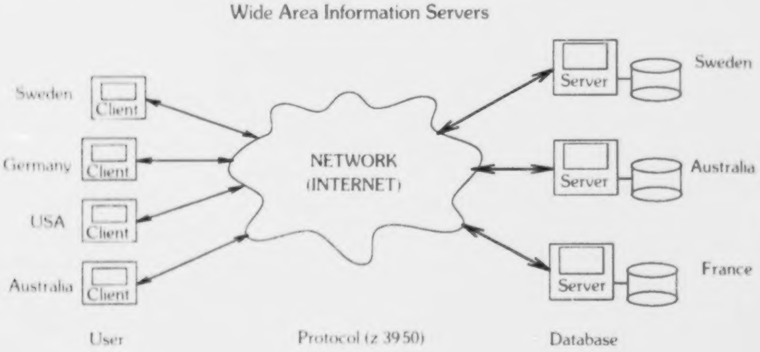
Wide Area Information Servers
Sweden
Client
Germany
Client
USA
Client
Australia
Client
NETWORK
(INTERNET)
Server
Sweden
Server
Australia
Server
France
User
Protocol (z 39.50)
Database

Figure 1.

The client handles the user interface, the server does the searching and retrieval of documents, and the protocol is used to transmit the queries and responses. The client and server are isolated from each other through the protocol. Any client which is capable of translating a users' request into the standard protocol can be used in the system. Likewise, any server capable of answering a request encoded in the protocol can be used.

On the client side, questions are formulated as natural language questions. The use of natural language for questions makes it easy to use WAIS. The WAIS client then translates the query into the WAIS protocol. The server translates the received question into its own query language, and searches for documents satisfying the query. The list of relevant documents is transmitted back to the client. The client displays the results sorted by a relevance ranking. The user can then select documents to be retrieved from the server (figure 2).

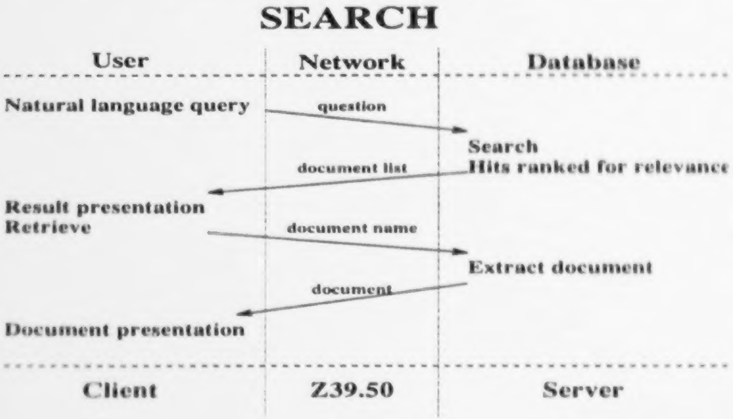
SEARCH
User
Network
Database
Natural language query
question
Search
Hits ranked for relevance
document list
Result presentation
Retrieve
document name
Extract document
document
Document presentation
Client
Z39.50
Server

Figure 2.

To further refine the search some of the retrieved documents can be marked as being "relevant" to the question at hand, and then re-run the search. The server recognizes the marked documents, and attempts to find others which are similar to them. This method of information retrieval is called "relevance feedback".

In order to find what databases are available through WAIS, Thinking Machines Corp. is maintaining a "Directory of Servers" in a widely accessible location. The "Directory of Servers" contains indexed textual descriptions of all known servers. It is queried just like any other source.

WAIS can be integrated with other distributed information systems like WWW and Internet Gopher where gateways are available today. WWW and Gopher use simpler protocols and these gateways can't utilize all WAIS features described above. WWW uses a hypertext model to guide the user through an information universe while Gopher uses a hierarchical menu system.

## 4. PROJECT PARTS: Lund Electronic Library Service

### 4.1 Integration with Other Distributed Information Systems

The number of Campus Wide Information Systems (CWIS) and Internet Gopher servers are rapidly growing (today several hundred). Many of them provide access to similar (or even the same) information. The popularity of WAIS is also steadily growing and there are now over 350 available WAIS databases. Connectivity between these systems is good, but they all suffer from a lack of consistent structure of the information offerings as well as good tools for finding relevant information sources. So there is a need for structuring the information and providing easy access by integration of the different systems taking advantage of their respective strengths.

In collaboration with the National Technological Library of Denmark we will test the possibility to integrate WWW and WAIS by establishing gateway functions between these two systems. One area we will improve is the possibility to find and select information sources. (e. g. better/automatic indexing of databases and documents, utilizing the hypertext possibilities of WWW to build a source selection tool).

### 4.2 Local Databases

We have started to collect information within three different areas (computer science, environmental studies and Internet use). In total about 40 MB of information is collected and made available in about 20 different WAIS databases.

### 4.2.1 Computer Science

The databases in this area cover:

1. Computer Science related books (bibliographic information) from Lund University Online Library Catalogue (LOLITA) together with

the library from the departments of Computer Engineering and Information Theory.

Plans are to augment this bibliographic information with content pages, indexes, chapter headings, etc. These information will be scanned from the books and converted to electronic text with OCR (Optical Character Recognition) technology.

2. Technical reports (titles and abstracts) from around the world as well as reports and publications from the department of Computer Engineering.

   We have plans to add access information in order to be able to automate the retrieval of complete technical reports and other publications via anonymous ftp. This will help us to hide the steps needed to get a remote compressed postscript file with a camera ready technical report printed on paper and thus provide the user with a simple and uniform interface.

### 4.2.2 Environmental Studies

The databases in this area cover:

1. Bibliographic information on environment related books from Lund University Online Library Catalogue. Plans are to augment this material in the same way as for Computer Science books.
2. Local journal content pages. These content pages are scanned and entered in the database when the journal arrives at the library.
3. A local directory database with over 500 environmental related research projects at 60 different departments at Lund University.
4. An archive of articles from over 30 relevant electronic conferences.

### 4.2.3 Internet Use

The databases in this area cover:

1. A large number of help texts which have been collected from various ftp-sites around the world.
2. Lists of available resources (libraries OPACs, electronic conferences, electronic mailing lists, electronic journals, agricultural services, etc) on the Internet.

The intelligent gateway function will, among other things, integrate Telnet with WAIS user interface so pointers in these databases can be used automatically to be connected to specific Internet services.

3. An archive of articles from relevant electronic conferences.
4. Bibliographies over networks with related books and articles.

### 4.3 Local Gopher Server

For easy access to our local databases we provide a Gopher server (telnet hugin.ub2.lu.se; login as gopher) with a local gateway to WAIS databases. This server also provides a way of disseminating other local information in a convenient way. It is also utilized to provide a structured access to international information sources.

### 4.4 Further Plans

- The WAIS software will be modified to support national special characters (in our case ISO 8859, latin-1).
- In collaboration with the Nordic Gene Bank we plan to make their seed databases available through WAIS. There will also be a possibility to order seeds directly through the WAIS user interface.
- Technical reports from a number of departments of Lund University will be made available internationally through a WAIS database.
- The search and relevance ranking algorithms of WAIS will be improved. Also support for Boolean and proximity searches will be tested.
- Active support for new users through onsite demonstrations and regular courses. We will also actively support other departments that wish to start their own WAIS-servers, for example to make their technical reports and other publications available.

### References

[BLCGP92] T. Berners-Lee, R.Cailliau, J. Groff and B. Pollerman. World Wide Web: The Information Universe. *Electronic Networking*, 2(1):52 - 58, 1992.

[Gop92] The Internet Gopher. *Electronic Networking*, 2(1):69 - 71, 1992.

[GOPHER] Readme for Internet Gopher. Available electronically via ftp from boombox.micro.umn.edu, file pub/gopher/00README

[Kah91] B. Kahle and A. Medlar. An Information System for Corporate Users: Wide Area Information Servers. Thinking Machines Corp, Cambridge, Mass. (Technical report TMC-199), Also in *ONLINE* 15(5): 56 - 60, 1991.

[Sko92] G. Skogmar. Det nordiska SR-projektet. *LIBRIS Meddelanden*, 63: 12 - 14, 1992. (In Swedish)

[WAIS] Readme for WAIS. Available electronically via ftp from think.com, file pub/wais/ README

[WWW] Readme for WWW. Available electronically via ftp from info.cern.ch, file pub/www/ README.txt

# Inter- and Intrabibliographical Relationships : A Concept for a Hypercatalog

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# Inter- and Intrabibliographical Relationships : A Concept for a Hypercatalog

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## Abstract

Most cataloging codes enable users to locate a well defined "bibliographic unit" easily, but they do not allow them to look for "literary units" without any problem. That all manifestations of a work should be gathered and displayed in physical proximity would need a change in the philosophy of cataloging. A mechanism to collocate various manifestations of a work can be based on bibliographic relationships for establishing links between the units concerned. Investigations show that these relationships between bibliographic units are analogous to the relationships between descriptors in a thesaurus. Therefore, concepts and experiences of handling the structure of a thesaurus can be applied in setting up an extended catalog with linked bibliographic units. International bibliographic numbers such as ISBN, ISSN, BIBLID, SICI, ISRN are recommended for the unique identification of the bibliographic units. For the implementation of such a system it is sufficient to define only the relationship between two bibliographic units. All other links can be generated by the system itself because of the characteristics of the relationships. A hypertext system is able to offer an appropriate interface to present these links. Then the end user selects related publications merely by clicking one of following features:

additional copies; variant editions; translations; predecessor or successor publications; parent or part publications; secondary literature.

# Inter- and Intrabibliographical Relationships : A Concept for a Hypercatalog

## 1. Introduction

Charles Ammi Cutter formulated the following objectives for the library catalog in 1876:

1. To enable a person to find a book of which either
   - A. the author
   - B. the title is known
   - C. the subject
2. To show what the library has
   - D. by a given author
   - E. on a given subject or
   - F. in a given kind of literature
3. To assist in the choice of a book
   - G. as to its edition (bibliographically)
   - H. as to its character (literary or topical)

Today only the first objective has been achieved in the traditional card catalogs as well as in their computerized versions. The second and the third objectives are accomplished only partly because bibliographic units at the analytical level are not recorded in general library catalogs. The "collocation function" is supported by uniform titles, cross references or notes but it is not implemented methodically.

Seymour Lubetzky (1953) emphasized the "collocation function" in addition to the "finding function", where various physical manifestations of a work such as different editions or translations are placed together. In the discussion of "bibliographic unit" versus "literary unit" Eva Verona (1959) selected the bibliographic unit. For her it is far more important that a user can easily locate a well defined "bibliographic unit" than to have all manifestations of a work gathered together and displayed in physical proximity. The International Conference on Cataloging Principles in Paris in 1961 resulted in the second edition of the "Anglo-American Cataloguing Rules" and the German code "Regeln für die alphabetische Katalogisierung (RAK)". The high expectations concerning further developments and harmonization of codes were not met.

The term "hypercatalog" was introduced in a project started in Sweden in the 80s at Linköping University. The conventional catalog was extended to a system with "...links and relations between fields, records and files...". Such a new catalog also holds records not available in the local collection (Hjerppe 1986, 1989). Similar arguments were presented by Patrick Wilson (1989) at a conference in Los Angeles in 1987 dealing with the "conceptual foundations of descriptive cataloging" (Svenonius 1989). The changing text of an electronic document and the concept of a work, together with the capabilities of computer networks led to redesigning the classical library catalog. Wilson pleaded for Cutters second objective and he also wanted "the work" as the unit to be described in the catalog instead of the physical unit which contains it. However, the task of defining works is rather complex. Therefore, a different approach is proposed in this paper. Fred Ayres (1990) suggested a manifestation entry to solve the problem of collocation.

## 2. Issues

Most cataloging codes enable users to locate a well defined "bibliographic unit" easily, but they do not allow them to look for "literary units" without any problem. The "finding function" is considered to be more important than the "collocation function". Different manifestations of a work as variant editions, translations, versions in other media or successor titles are not necessarily placed together in sequence in present systems. References to other manifestations are not recorded systematically and they always refer in one direction such as for example from a later edition to an earlier one or from a translation to the original publication. Furthermore, such references are not standardized and therefore they cannot be used to generate links automatically.

## 3. Proposed Solution

The mechanism to collocate various manifestations of a work can be based on bibliographic relationships for establishing links between the units concerned. Bibliographic relationships can be defined as associations between two or more bibliographic units (Tillett 1991). Monographic as well as serial publications were considered as bibliographic units including publications at the analytical level.

Bibliographic relationships already mentioned in the literature were collected and further investigated. Data formats like UNIMARC, the

Common Communication Format and the Reference Manual for Machine-Readable Bibliographic Descriptions were considered together with the ISDS format used for serial publications. The second International Essen Symposium, 1981, was dedicated solely to "hierarchical relationships in bibliographic descriptions" and Paula Goossens gave a good view with many illustrative examples. In her dissertation Barbara Tillett (1987) analyzed 24 cataloging codes to determine their capabilities to express bibliographic relationships. A test of machine-readable records of the Library of Congress resulted in a comprehensive list of bibliographic relationships.

Examinations revealed parameters such as the presentation medium, text, language, time, and bibliographic level to define the bibliographic relationships in the following groups:

a) equivalence relationship
b) horizontal relationship
c) chronological relationship
d) hierarchical relationship
e) relationship "shared characteristics"

### a) equivalence relationship

The hold between the exact copies of a work independent of the medium of presentation (print, microform, electronic).

Examples:
duplicate, reprint, facsimile, microfiche or microfilm, "Current Contents" of ISI on floppy disc, full-text of a journal article on an ADONIS CD-ROM

### b) horizontal relationship

The hold between different versions of a work concerning text or language.

Examples:

- editions (2nd enlarged edition, abbreviated and simplified edition for children)
- translations (any - independent of the quality)
- arrangements, adaptations, evaluations, reviews, critiques, commentaries, abstracts, secondary literature

### c) chronological relationship

The hold in time between units which follow or precede one another.

Examples:
predecessor or successor of a journal,
successive volumes of a monographic series

### d) hierarchical relationship

The hold between the whole and its parts but also between parts and the whole.

Examples:
- chapter in a book
- article in a journal
- special issue of a journal
- single volume of conference proceedings
- poem in a collection
- accompanying material
- supplements

### e) relationship "shared characteristic"

The hold between bibliographic units which share the same formal characteristics such as author, language, publisher, year, subject heading, classification code, document type etc.

Examples:
already available system features such as looking for an author's name, limiting a query result by language or year, making a subject search by title word, subject heading, LCCC or cited author

The relationship "shared characteristics" does not fit into the taxonomy above. The reason why it is included is, first of all, comprehensiveness and secondly the fact that the classical retrieval features on string matching can be incorporated.

Example: Publications of Essen University Library

The proceedings of the International Essen Symposium acts as a good example to demonstrate bibliographic relationships (figure 1). Hierarchical relationships exist between the proceedings, the individual volumes and the individual papers. As an illustration for all contributions, only one paper is quoted here identified with a BIBLID number. Chronological relationships exist between the individual volumes of the monographic series. The proceedings themselves are identified by two different ISSNs because of a change in the German name of the university which results in a change of the ISSN. Each individual volume carries an ISBN. The fact that the second volume is at the same time the fourth volume of another serial publication, namely the "INTERMARC software subgroup seminar", directs to additional volumes of the monographic series.

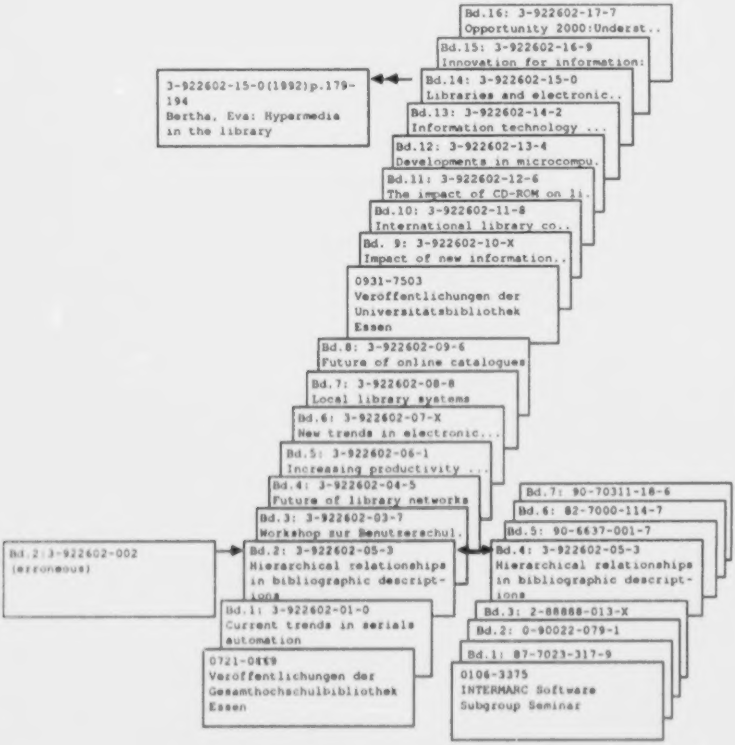
Bd.16: 3-922602-17-7
Opportunity 2000:Underst..
Bd.15: 3-922602-16-9
Innovation for information:
3-922602-15-0(1992)p.179-194
Bertha, Eva: Hypermedia in the library
Bd.14: 3-922602-15-0
Libraries and electronic..
Bd.13: 3-922602-14-2
Information technology ...
Bd.12: 3-922602-13-4
Developments in microcompu.
Bd.11: 3-922602-12-6
The impact of CD-ROM on li.
Bd.10: 3-922602-11-8
International library co..
Bd. 9: 3-922602-10-X
Impact of new information..
0931-7503
Veröffentlichungen der Universitätsbibliothek Essen
Bd.8: 3-922602-09-6
Future of online catalogues
Bd.7: 3-922602-08-8
Local library systems
Bd.6: 3-922602-07-X
New trends in electronic...
Bd.5: 3-922602-06-1
Increasing productivity ...
Bd.4: 3-922602-04-5
Future of library networks
Bd.3: 3-922602-03-7
Workshop zur Benutzerschul.
Bd.2 3-922602-002
(erroneous)
Bd.2: 3-922602-05-3
Hierarchical relationships in bibliographic descriptions
Bd.1: 3-922602-01-0
Current trends in serials automation
0721-04[illegible]
Veröffentlichungen der Gesamthochschulbibliothek Essen
Bd.7: 90-70311-18-6
Bd.6: 82-7000-114-7
Bd.5: 90-6637-001-7
Bd.4: 3-922602-05-3
Hierarchical relationships in bibliographic descriptions
Bd.3: 2-88888-013-X
Bd.2: 0-90022-079-1
Bd.1: 87-7023-317-9
0106-3375
INTERMARC Software Subgroup Seminar

Figure 1: Publications of Essen University Library

Empirical studies of McNellis and Tillett have given unexpectedly high figures of existing bibliographic relationships depending on the amount of

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data and on which relationships were checked. Information about bibliographic relationships has been found in the catalog of the Library of Congress in 75% of the records.

## 4. Realization

Investigations have shown that the relationships between bibliographic units are similar to the relationships between descriptors in a thesaurus. Therefore, concepts and experiences of thesauri can be applied to create a system for linking bibliographic units (Milstead 1990). In order to establish the structure of such a system it is sufficient to define only the relationship between two bibliographic units. All other links can be generated by the system itself because of the characteristics of the relationships.

The equivalence relationship between bibliographic units is analogous to the relation "synonyms". The broad horizontal relationship corresponds to the associative relation in the thesaurus. The chronological and the hierarchical relationships match the generic and the partitive relations between descriptors. The reciprocity of the symmetric and inverse relationships can be used to reduce the redundancy in the database. The transitivity allows to relate all bibliographic units concerned.

International bibliographic numbers are recommended for a unique identification of the bibliographic units (Crawford 1986, Chan 1983, Stern 1989).

ISBN = International Standard Book Number
LCCN = Library of Congress Card Number
ISRN = International Standard Report Number
ISSN = International Standard Serial Number

CODEN
BIBLID = Bibliographic Identifier
SICI = Serial Item and Contribution Identifier
ADONISnumber

Monographic publications can be identified with ISBN, LCCN or ISRN, serial publications with ISSN or CODEN. Publications at the analytical level can be defined by BIBLID, SICI or ADONIS numbers. These three are based on the ISSN with additions in order to specify the contribution in the serial. However, they are not as widely accepted by the information community as the established numbers ISBN or ISSN.

To overcome the difficulty of different identification numbers for the same bibliographic unit (e.g. a correct and an erroneous ISBN) an additional relationship “identity“ has to be introduced. By doing so identification numbers of different origin or quality can be related to one another. Therefore, the incorporation of local call number systems is provided and the correspondence with international systems can be performed.

Bibliographic units numbered by international standards do not always meet the requirements of librarians and end users. The ISBN identifies an edition in a fixed binding, the product sold by the publisher. That implies that a hardbound edition carries a different ISBN than the paperback edition of the identical title. Hence, Wilhelm Neubauer (1983) mentioned the problem of “selling entity“ versus “bibliographic entity“.

## 5. Use of the System

A hypertext system or at least a system with a hypertext interface is suggested for the implementation because this type of system is able to present links in a more user-friendly way. The complex structure of the bibliographic units requests a powerful database management system to perform nested queries.

The classical retrieval function of matching formal characteristics like the name of an author, publisher or subject heading is also embedded in the system of relationships. It can be called up with the feature “shared characteristics“.

The hypertext system is able to offer an appropriate interface to present links for related publications (figure 2). The end user activates these links after a query using the hit as the starting point merely by clicking one of following buttons on the screen:

- additional copies
- variant editions
- translations
- predecessor or successor titles
- parent or analytical publications
- secondary publications

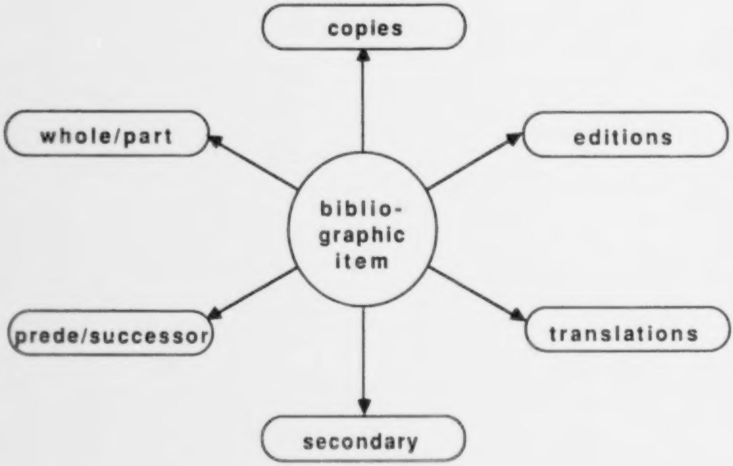

Figure 2: New functions in the hypercatalog

## 6. Summary

Establishing links between bibliographic units is independent of the cataloging code employed in the bibliographic system.

It is recommended to identify the bibliographic units using international standard numbers; already existing local number systems can be incorporated using the identity relationship.

The proposed linking mechanism is applicable to monographic as well as serial publications and it includes bibliographic units at the analytical level.

Links need not be recorded simultaneously with the input of the bibliographic unit itself. They can be added later, although the comprehensiveness of the recorded relationships affects the quality of the system.

The intellectual effort to position a new bibliographic unit by defining its relationships to other units has been performed anyway during the acquisition and cataloging process. The relationship has to be recorded by allocating compact standard numbers.

Linking together all different manifestations of a work will encompass the work in its entity as suggested by Patric Wilson.

Further studies should be carried out to develop a comprehensive set of various relationships to extend the system of bibliographic relationships. Links concerning the topic of the work which are not based on formal criteria such as string matching could enrich the quality of systems immensely.

## Acknowledgements

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## Bibliography

1. ANSI/NISO Z39.56-1991: Serial Item and Contribution Identifier. American National Standard for Serial Item and Contribution Identifier (SICI). New Brunswick: Transaction Publishers 1991.

2. Ayres, F.H. Duplicates and other Manifestations - a New Approach to the Presentation of Bibliographic Information. In: Journal of Librarianship; 1990; 22(4): 236-251.

3. Chan, Lois Mai. Numbering and Coding Systems for Bibliographic Control in Use in the United States of America. International Cataloguing; 1983; 12(4): 46-48.

4. CCF: the Common Communication Format. 2nd ed. Simmons, Peter; Hopkinson, Alan. Paris: Unesco; 1988; PGI-88/WS/2. 196 p.

5. Crawford, Walt. The Number Game. The Curious Family of Standard Numbers. Journal of Educational Media and Library Sciences; 1986; 23(4): 333-347.

6. Goossens, Paula. Hierarchical Relationships in Bibliographic Descriptions: Problem Analysis In: Hierarchical Relationships in Bibliographic Descriptions; Library Systems Seminar, Essen, 25. 3. - 27. 3. 1981; Essen: Gesamthochschulbibliothek Essen, 1981: 13-128; ISBN: 3-922602-05-3.

7. Hjerppe, Roland. Hypercatalog and Three Meta-Schemata for Database Views: Knowledge Organising, Collection derived, and User Established Structures. In: Kinsella, Janet, ed. Online Public Access to Library Files: Second National Conference. Oxford: Elsevier International Bulletins; 1986: 101-110; ISBN: 0-946395-25-X.

8. Hjerppe, Roland. Hypercat at LIBLAB in Sweden: a progress report. In: Hildreth, Charles R., ed. The Online Catalogue. Developments and Directions. London: The Library Association; 1989: 177-209; ISBN: 0-85365-708-4.

9. Hopkinson, Alan; McCallum, Sally; Davis, Stephen P. UNIMARC Handbook. International Federation of Library Association and Institutions. London: IFLA International Office for UBC; 1983; ISBN: 0-903043-40-8.

10. ISDS International Centre. ISDS Manual. ed. by Mullis, A. A. Paris: ISDS International Centre; 1983; ISBN: 2-904938-00-1.

11. ISO 2108-1978: Documentation - International Standard Book Numbering (ISBN). 2nd ed.: International Organization for Standardization; 1978.

12. ISO 3297-1986: Documentation - International Standard Serial Numbering (ISSN): International Organization for Standardization; 1986.

13. ISO 9115-1987: Documentation - Bibliographic Identification (BIBLID) of Contributions in Serials and Books: International Organization for Standardization; 1987.

14. ISO/DIS 10444 : Information and Documentation - International Standard Technical Report Number (ISRN): International Organization for Standardization; 1991.

15. McNellis, Claudia Houk. Describing Reproductions: Multiple Physical Manifestations in the Bibliographical Universe. In: Cataloging & Classification Quarterly; 1985; 5(3): 35-48.

16. Milstead, L.J. Thesaurus Software Packages. In: Henderson, D. Information in the year 2000: from Research to Application. Medford, NJ: Learned Information; 1990: 3-15.

17. Neubauer, Karl Wilhelm. International Standard Book Numbers: their Development and Potential in Bibliographic Systems. Part 2. International Cataloguing; 1983; 12( 3): 35-36.

18. Reference Manual for Machine-Readable Bibliographic Descriptons. 2nd. rev. ed. Dierickx, Herold; Hopkinson, Alan. Paris: Unesco; 1981; PGI/81/WS/22. 341 p.

19. Stern, Barrie T.; Campell, Robert M. ADONIS - Publishing Journal Articles on CD-ROM. In: Advances in Serials Management; 1989; 3: 1-60.

20. Svenonius, Elaine, ed. The Conceptual Foundations of Descriptive Cataloging. San Diego: Academic Press; 1989. (Library and Information Science); ISBN: 0-12-678210-5.

21. Tillett, Barbara Ann Barnett. Bibliographic relationships: toward a conceptual structure of bibliographic information used in cataloging: University of California, Los Angeles; 1987. Ann Arbor : University Microfilms International.

22. Tillett, Barbara Ann Barnett. A Taxonomy of Bibliographic Relationships. In: Library Resources & Technical Services; 1991; 35(2): 150-158.

23. Verona, Eva. Literary Unit Versus Bibliographic Unit. In: Libri; 1959; 9(2): 79-104.

24. Wilson, Patrick. The Second Objective. In: Svenonius, Elaine, ed. The Conceptual Foundations of Descriptive Cataloging. San Diego: Academic Press; 1989: 5-16. (Library and Information Science); ISBN: 0-12-678210-5.

# CD-ROM in Heterogeneous University Environments

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# CD-ROM in Heterogeneous University Environments

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**Kreuzlingen**
**Switzerland**

## Abstract

**DEC PC users can use app. 5,800 CDs through InfoServer 150 and Pathworks diskservice.**

**By using Logicraft Access Server technology for MS-DOS you can use terminals and workstations as well as X.11 terminals from all manufacturers. To retrieve information from the InfoServer 150 first access MS-DOS on the Logicraft LAS-486 or LAS-304, and then access with PATHWORKS 4.1 support the InfoServer CD diskservice.**

**This is accomplished by using the VAX as an access and CD-ROM licence controller for legality of user name and password and for later statistics who has used what-how often-and how long- CD-ROM platter. When the requesting terminal has chosen the application from the Logicraft CD manager with user queues (copyright by Stanford University) on the host computer, the VAX lets the Logicraft Access Server remoteboot from one of its variable DOS container files, which stores the information what physical drive or group of drives have to be mounted from the InfoServer 150 to get the retrieval program started.**

**Now we use the Logicraft client/display-server-system and the information from the Intel based machine flows over the network to the requesting terminal showing all attributes in color or black and white on a VT-xxx or DEC workstation or VTX-2000. Here we have the advantage to choose from 6 different fonts to have very**

large MS-DOS sessions. If the output of the retrieval is alphanumeric the data can also flow to VT-xxx terminals or ANSI-terminals or emulations on PCs or even through modem lines to remote users.

With this logical combination we get following advantages: The data of the DOS based CD retrieval program will be searched and indexed directly by the Intel processor and does not load the VMS or DEC system. Only the Ethernet controller of the VAX is responsible for the transport of questions and answers to the requesting screen and brings the keyboard signals back to the Intel process.

On host systems, which do not have an InfoServer 150 or Meridian or CBIS, all DEC VMS, DEC ULTRIX, HP-9000, SUN Sparc, IBM RS-6000, Bull DPX-20 and all X.11 terminals can connect to the Logicraft CD server directly which then has 1 to 28 CD-ROM drives via SCSI installed (then all components will be housed in a 19 inch cabinet). The expansion with a Swiss CD changer with 200-800 CDs will be available in first quarter of 1993, then 15 drives will serve the network users with the advantage that no data is jamming the Ethernet.

Thanks to LOGICRAFT's client/display-server principle and the virtual addressability of users which have no Intel intelligence.

# CD-ROM in Heterogeneous University Environments

CD-ROM technology finally became popular in the last 2 years, originally planned as a distribution media. CD-ROM discs were planned to go on single PCs and now they want to be used on PC networks and on "Non Intel" machines like DEC's VT-Terminals, VAX Computers and UNIX based workstations.

Most of the universities now talk about heterogeneous environments because they have a variety of end user terminals. I was asked from several universities if we can integrate MEDLINE, Current Contents or Books in Print CD-ROMs on campus networks defined by RS-6000 IBM workstations, SUN Microsystems Sparcstations, DEC or Hewlett Packard environment. This is possible, even with its MS-DOS based retrieval engine when using client/display-server technology.

The CD-ROM media with its rotation speed of 200 to 530 turns per minute is approximately 10 times slower than a hard disk. Although this technical limit and the slow data transfer of 150KB to 290KB exists, people expect to use the CD in a multi-user environment, which creates two problems: one technical and one licence problem.

All end user devices on a heterogeneous network have different kinds of control mechanisms with keyboards and display of data, e.g. ANSI, X.11, alphanumeric black and white or with color and VGA displays. The larger part of the market for CD-ROMs is produced for MS-DOS, but I know that some students and many professionals do not have access to an Intel based PC. The steady success of the companies like SUN Microsystems, DEC, HP and IBM have not been recognized by the publishers of CD-ROMs. The result is that the retrieval engines for CD-ROM are divided into segments of app. 10% for MAC Computers, 80% for MS-DOS systems and the rest is being produced by the four major workstation manufacturers. They distribute their UNIX code on CD and have their workstations look at operating system documentation of OpenVMS and UNIX systems.

All manuals are being replaced at DEC, HP, IBM, SUN. These companies do not deliver books anymore, they deliver a CD-ROM and this can only be read on the workstation's CD drive.

The audio-visual developments, called multi-media, will take some of these percentages very soon. With the media CD-ROM you now can load MS Windows 3.x, Windows NT from Microsoft and you can load the binaries from SCO UNIX and SOLARIS - the new buzzword from SUN and its partners to have easy loading of software for Sparc and soon for Intel.

Obviously, MS-DOS based CD-ROM in heterogeneous networks will especially interest the user organizations, which have a colorfull palette of end user devices, MACs of different generations, PCs with serial connections or with network integration through Novell, Banyan or LAN manager networks, like Pathworks from Digital, or NFS networks based on IBM, SUN and HP machines. All networked devices have a very interesting advantage, they can use a client/server principal for accessing data and loading of programs.

Client/server is used in the modern "right sizing" market and can be explained in two ways. I want to distinguish between client/file-server and client/display-server.

Client/file-server technology is used between a PC and another machine called file-server to load application programs and CD-ROM data to the requesting PC.

Client/display-server technology is used in the sense like SUN and DEC say it, "The network is the computer."

This means that you have a lot of systems and devices on one Local Area Network, which all are able to execute on data retrieval engines and work with SQL database languages. Also PCs use file-servers to get CD-ROM access: e.g. CBIS, InfoServer 150 from Digital and Meridian.

All data from a CD drive or CD server has to be transferred over the network to the requesting PC and will be analyzed in that Intel PC with a MS-DOS retrieval program and the result is displayed on the monitor of the PC. This is client/file-server technology.

For client/display-server technology a different method is used. The end user devices can be VT-terminals, PCs, MACs with MacX, X.11 terminals or X.11 workstations and here you can watch a client process on a host computer to retrieve data through SQL statements. This means from the location where you are looking into datafiles only the questions of a SQL statement and its answers are transferred to you. The data in its entity is held centrally at the host computer and can be accessed by many users at the same time.

This technology cannot be applied to Microsoft's DOS because it is a very simple operating system although it looks so nice with MS Windows 3.1. The MS-DOS 3.3 and 5.0 has to be operated within an Intel based machine and has to show its application picture on a VGA monitor in color or black and white.

## Solution to the Technical Problem

In 1987 Logicraft has introduced a technology which takes MS-DOS into three pieces. The process on an Intel based server is one piece, the application picture is the second piece and can be displayed by Logicraft Software on any ANSI or X.11 terminal. The third piece is the bootcontainer file on a DEC, SUN, HP, IBM Control server to get MS-DOS run in a client/display-server environment. Logicraft's engineers will remove the Hercules or VGA display adapter from a 386/486 PC and can drive the application pictures through Ethernet or Token-Ring to a X.11 display-server. This means, that we can change the functionality of DOS and divide it into three pieces to show it on a X.11 workstation even with DOS 3.3, 5.0 and MS windows 3.x or OS/2.

Logicraft supplies fonts for the IBM PC character sets in the X.11 installation routine and this gives variable size colortext DOS Windows to the workstation and the applications can be viewed in 6 different sizes by choice of fonts through the workstation mouse.

If the user has only a VT-terminal for alphanumeric display then the Logicraft Intel based server (piece one) running DOS can display only alphanumeric data like FOXpro, dBASE, SuperCalc, Norton and many wordprocessors because we load the IBM PC characters with download character set into the VT-terminal (piece two). This enables us to work in any country also in cyrillic language areas.

The product which can do this is called OmniWare. It replaces a VGA or Hercules card, which is normally installed in a PC.

**You really have to remove the video adapter and you do not connect a monitor anymore, you do not connect a PC keyboard anymore, you ask your hardware support engineer to replace the videoscreen and the keyboard with the Logicraft OmniWare board.**

After this modification the PC does everything it did before but it displays its application image somewhere on an Ethernet workplace. Now it is your choice - which virtual user calls - the MS-DOS application picture - where on your LAN.

If we limit this use for alphanumeric CD-ROM retrieval, e.g. Medline, ISI, Current Contents or Computer Select, we can also use this application picture through modems which are connected to the modems of a host system. In other words, if you want to use alphanumeric CD-ROM retrieval engines from DATAWARE or COBRA, which look at alphanumeric CD-ROM databases, you can work locally on your LAN and its terminals or you can access these functions through X.25 WAN connections or campus wide integration on heterogeneous networks, even with other universities (see Picture 1).

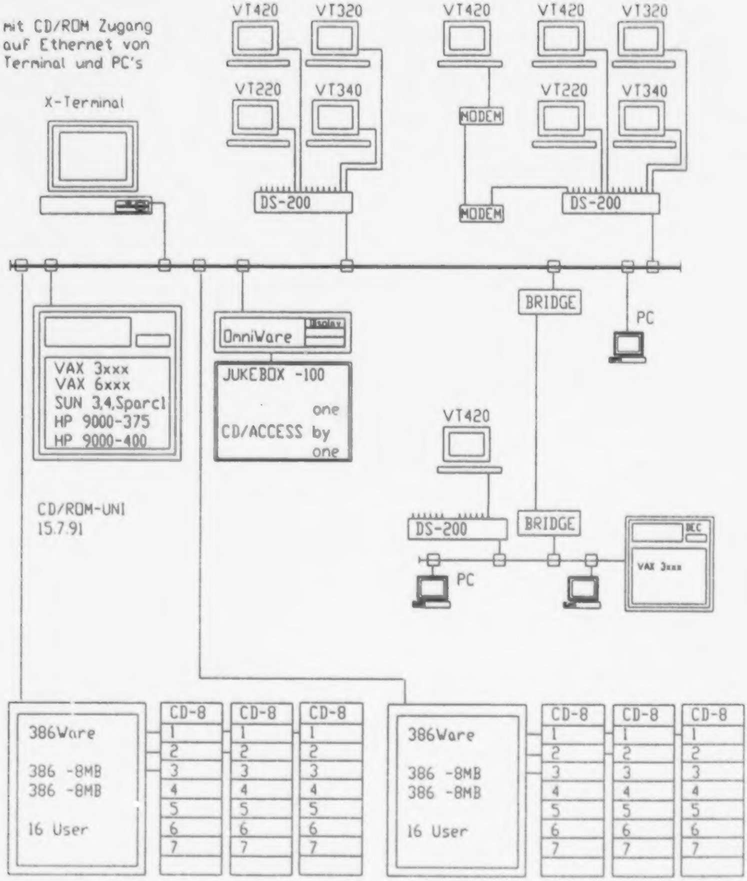
You can also go home in the evening, use your modem and log-in to the university control server which has the security and access control of OpenVMS or UNIX and then start the retrieval software by using Logicraft's display-server technology.

Now you can look at CD-ROM data on your PC at home, because we do not transport the data over this modem line, we only transport the questions and the answers like visualization extension of the Intel based process from the EDP-center.

Logicraft is not competing with integrating PCs like DEC, HP, SUN, and IBM for file-, print- and diskservices.

**Logicraft integrates with the client/display-server principle INTEL based applications to end user devices on heterogeneous networks.**

You can even use your older PCs which have only a 286 or 386SX CPU with 512 - 640K RAM, especially when the application is limited to alphanumerics like dBASE because we use the PC only with a VT-xxx terminal emulation. There is no need to have HIMEM and QUEMM and


mit CD/ROM Zugang
auf Ethernet von
Terminal und PC's
X-Terminal
VT420
VT320
VT220
VT340
DS-200
VT420
MODEM
MODEM
VT420
VT320
VT220
VT340
DS-200
BRIDGE
PC
VAX 3xxx
VAX 6xxx
SUN 3,4,Sparcl
HP 9000-375
HP 9000-400
OmniWare
Display
JUKEBOX -100
one
CD/ACCESS by
one
CD/ROM-UNI
15.7.91
VT420
DS-200
BRIDGE
DEC
VAX 3xxx
PC
386Ware
386 -8MB
386 -8MB
16 User
CD-8
1
2
3
4
5
6
7
CD-8
CD-8
386Ware
386 -8MB
386 -8MB
16 User
CD-8
CD-8
CD-8

Access from Terminals or Terminals via Modem, Bridges also allow on remote LAN's

access for max 16 User on max 21-24 CD/ROM drives.

This can be multiplied by two (example above) or more.

Access to a CD/ROM Jukebox is also possible, but only one by one somewhere on the network.

*(Picture 1: Network at the University Library Graz)

other tricks to get enough memory, we only need 250K to run a terminal emulator like Reflection 2+ or Termware on an older type PC to run CD-ROM retrieval service via the "control server" on CD-Ware.

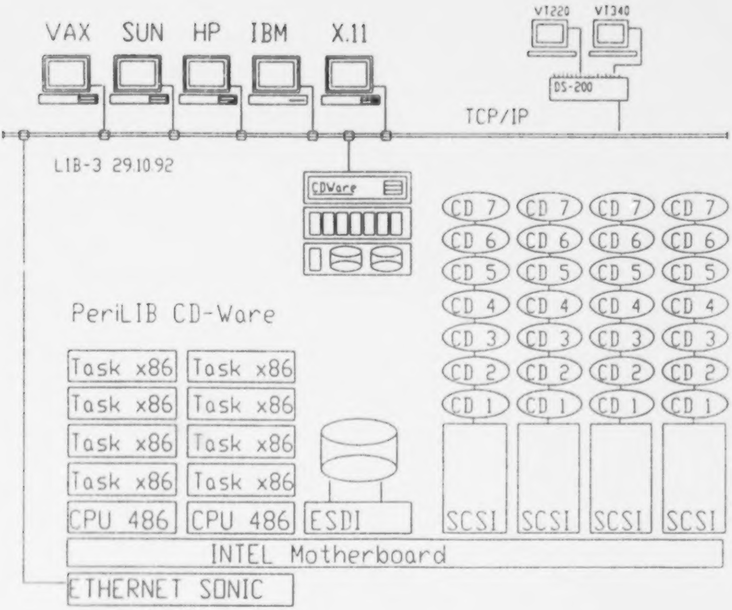
The CD-ROM display can also work on MAC when you use Apple's version of Reflection 2+ or MacX, the X.11 server from DEC. On NCD, Tektronix, DEC and IBM X.11 terminals and on workstations of all manufacturers the DOS application image displays also correctly. Logicraft always supplies the fonts in Binary Distribution Format (BDF) and you can compile them locally on your X.11 display-server, but that is only necessary if you have one which was not on my list so far. This BDF is based on standards which have been defined about 10 years ago by MIT; today we speak about X.11-R4 which it is the basis of all graphical user interfaces, also OSF/Motif which is used in the DEC, SUN, HP and IBM workstation environment and is still true on the Alpha from DIGITAL which comes to the market these days.

I mentioned the SQL server before and here I want to express that CD-Ware is working similarly, because all data between the CD-ROM drive and the Intel processor is direct without a network. Only the visualization network is getting the question and brings the answer to the end user's display-server.

Now I want to talk about solutions which have been installed 1991 at the University Library Graz, Austria, and is installed in 155 Swiss and German companies from banking to all kinds of administration. We have explained how to modify the Intel PC with OmniWare; we can also use the Logicraft's 386/486Ware as a Multi-DOS-system for CD-ROM retrievals.

The second picture shows our SuperServer twice (one in a box and one in exploded details). It has minimum 2 and maximum 5 Intel CPUs and these have direct contact through SCSI connection to the CD-ROM drives.

From your terminal, PC or X.11 workplace, you only give a command to the CD manager on the control server to start a retrieval engine and its associated CD drives. From your first application screen the work is done within CD-Ware, we do not load the host, we use only the Ethernet controller of the control server to transfer applications.


VAX
SUN
HP
IBM
X.11
VT220
VT340
DS-200
TCP/IP
LIB-3 29.10.92
CDWare
PeriLIB CD-Ware
CD 7
CD 6
CD 5
CD 4
CD 3
CD 2
CD 1
Task x86
CPU 486
ESDI
SCSI
INTEL Motherboard
ETHERNET SONIC

(Picture 2: with “control server“ running on the VAX)

The data never touches the network, only the question goes over the network to CD-Ware's Intel Processors and the results are displayed to the place where you are logged in. This makes it possible to use the DOS client process on heterogeneous networks of all kinds described before, only the results of a retrieval go to the X.11 display-server.

I was talking to companies which have to look for some or many of the 2000 existing CD-ROMs for patents (European, World, German, English, and American patents) and its true that 400 more CDs are coming every year. The Japanese patent offices will also start very soon, so these numbers will increase. This patent application solution can only be used on WANs and LANs, because this is full-text and graphics display, based on G3 fax format, one common retrieval engine can be used for all countries from Jouve France. (This application works on Logicraft OmniWare and CD-Ware since 1991). On your LAN connection with workstations or intelligent X.11 displays you can now also use PCs with MS-Windows 3.1 and an X.11 server, e.g.: Deskview-X, Hummingbird HCL eXceed, PC DECwindows, PC X-View, PC-XVision and others coming to the market.

The new version of retrieval software from Jouve, France, allows the integration of the Incom 100 CD changer to be integrated with one OmniWare to the heterogeneous work (see picture 1).

## Solution to the Licensing Problem

This subject is divided into 3 categories:

1. Single use on PC

2. Network use on PC networks

3. Concurrent use on heterogeneous networks or PC networks.

The Logicraft CD-Ware solution does not use a network version of the retrieval program.

We don't use a network, because we have the Intel processors and the SCSI connectors all built in one cabinet. There is no network in the machine, only a visualization network to the user on the LAN, MAN or WAN. CD-Ware does the work on single user licences and it works for 4 people at the same time on the same CD drive and with the same logical hard disk. We cannot recommend to go higher because there are physical limits on the CD-ROM drives. PeriTEC has done some research with R&R Messtechnik in Graz, Austria, to PRECACHE CD-data via hard disk. This is working and the performance is app. 20 times better, but it requires concurrent use licences described later.

Logicraft can handle 8-12 users, if they separate their subjects on the 7-28 CD drives. This means with Logicraft CD-Ware you do not need network software licences.

Now I want to open the discussion on the third type of licence, please talk in the future about "concurrent use" licence. I hope that this is a proposal, which helps librarians and users of Logicraft to handle single user licences in a controlled multiple form e.g. through our CD manager on a control server like VAX and other UNIX Hosts.

We want to point out that CD-ROM applications and integrations must be easy, we do not want that there is additional work for the librarian or for the system manager of a DEC, SUN, HP and IBM host system.

We integrate CD-Ware for the host manager in a visit of 2 to 3 days in a very large university campus installation and then he has the knowledge of the MS-DOS and UNIX specialities with client/display-server principle.

Definitely there is no additional training for the end user, because if somebody knows how to handle DATAWARE based or Bertelsmann COBRA based retrieval engines it will be exactly the same on a VT-xxx or Macintosh running through this display-server technology.

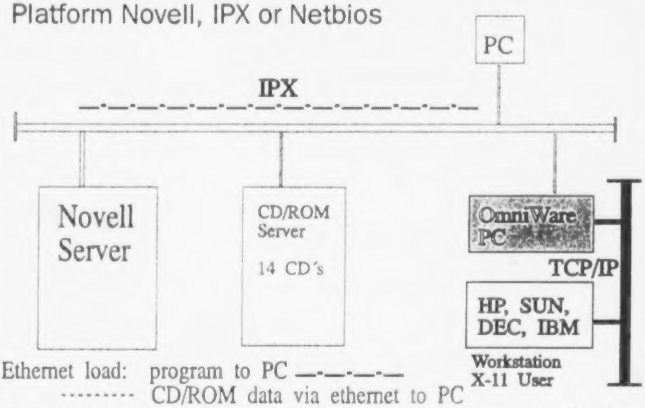
I also want to point out that this solution has no memory problems, because the task memory is logically 704K (or really 720K) in the Logicraft CD-Ware.

Network software installations are not necessary, they cannot be used; the network is only used as a transport for the DOS client process to its application picture of the end user's display-server.

In this environment you can also add jukeboxes with 100 positions from Incom, Germany, jukeboxes from Canada, containing 240 platters, and in the first quarter 1993 the Swiss CD changer which carries 800 CDs and it has 15 readers installed. An automatic hand inside can handle 200 and 600 platters and it can be used as add-on by many installations on the network because there are enough readers to connect to the CD subject.

Logicraft is glad to announce the very positive cooperation with Holthaus & Heinisch and other Meridian distributors, worldwide, specially in America, Stanford University, where we handle large PC based Novell networks with Meridian towers and MULTI-OmniWare PCs, so Meridian solution can be seen on UNIX workstations. This means, the combination of existing networks, based on Meridian, CBIS and InfoServer 150, can be extended via OmniWare to the other world of VT-terminals and to the world of UNIX workstations.

## Platform Novell, IPX or Netbios



PC

**IPX**

Novell Server

CD/ROM Server

14 CD´s

**OmniWare PC**

**TCP/IP**

**HP, SUN, DEC, IBM**

**Workstation X-11 User**

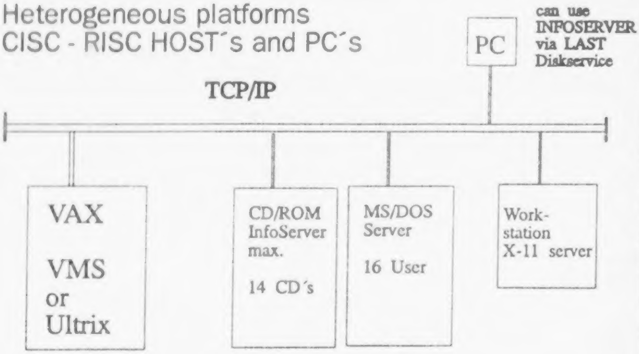
Ethernet load: program to PC —·—·—·—

--------- CD/ROM data via ethernet to PC

Important LOAD of ethernet during retrieval of data , only WAN

CD/ROM integration in heterogeneous networks PeriTEC AG

## Heterogeneous platforms CISC - RISC HOST´s and PC´s



PC

**can use INFOSERVER via LAST Diskservice**

**TCP/IP**

VAX

VMS or Ultrix

CD/ROM InfoServer max.

14 CD´s

MS/DOS Server

16 User

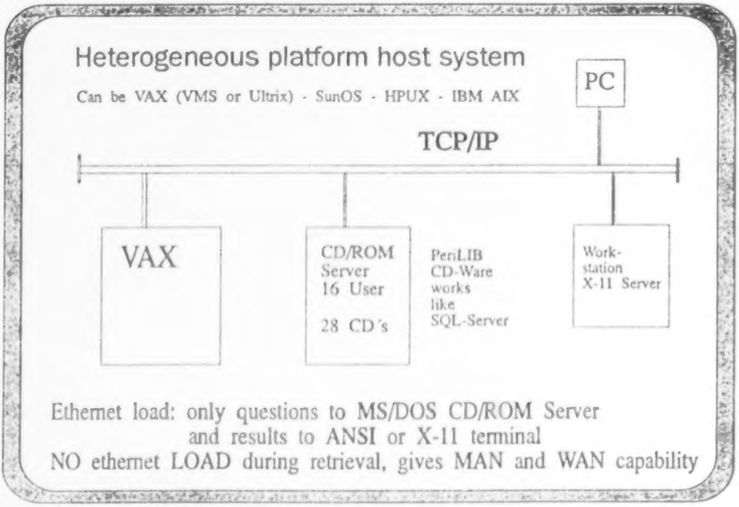
Work-station X-11 server

Ethernet load: program to MS/DOS Server
CD/ROM data via LAST protocol to MS/DOS Server
result to ANSI or X-11 terminal (even with modem)

CD/ROM integration in heterogeneous networks PeriTEC AG

The last picture shows the solution when the Logicraft CD-Ware is used only. This is typically used in OpenVMS and UNIX host based systems where we do not find PCs or where we do find color full selection of end user devices, MACs, terminals and older PCs.

Think about the analogy with the SQL engine: the questions go over the heterogeneous network to the CD-Ware, the client process works and gives the answers through the same network to the end user device.


Heterogeneous platform host system
Can be VAX (VMS or Ultrix) - SunOS - HPUX - IBM AIX
PC
TCP/IP
VAX
CD/ROM Server 16 User
28 CD's
PeriLIB CD-Ware works like SQL-Server
Work-station X-11 Server
Ethernet load: only questions to MS/DOS CD/ROM Server and results to ANSI or X-11 terminal
NO ethernet LOAD during retrieval, gives MAN and WAN capability

CD/ROM integration in heterogeneous networks PeriTEC AG

# Successfully Managing a CD-ROM Network : Necessary Tools, Organizational Aspects, and Consequences for the Library

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Göttingen
Germany

# Successfully Managing a CD-ROM Network : Necessary Tools, Organizational Aspects, and Consequences for the Library

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**Germany**

## Abstract

A CD-ROM network, consisting of a CD-ROM server, the CD-ROM server software, the utility programs for the workstations, only offers the technical way to the CD-ROM through a network, but not the organization and the management of such a network.

To offer public access to a CD-ROM network in a library, many additional programs or tools like a menu system or a licence control are necessary. My survey will touch on the tools which are necessary and very important.

The organization of a CD-ROM network has to regard the dynamic structure of CD-ROM retrieval programs: monthly updates, new releases, more CDs and different end user interfaces. The following survey will discuss organizational aspects which result out of this dynamic structure.

A CD-ROM network does not automatically allow the parallel access to CD-ROMs. Licence contracts have to be regarded. This is one of several consequences which will be discussed.

# Successfully Managing a CD-ROM Network : Necessary Tools, Organizational Aspects, and Consequences for the Library

Successfully managing a CD-ROM network must cover necessary tools, organizational aspects, and consequences for the library and are explained shortly in the following.

## 1. The CD-ROM Network

After having bought a CD-ROM network, for example Meridian Data CD-NET, Optinet, Multiplatter or Logicraft CD-Ware, and after having successfully installed the hardware and the software, all these CD-ROM network solutions offer you the technical possibility to access CD-ROMs simultaneously.

Sometimes a collection of tools like a tiny menu system or some statistical programs are also part of the software package. These tools are designed for managing small networks without any contribution to network security and they are part of the packages for marketing reasons. In most cases these tools can be neglected and we have to look for a general platform to manage and organize CD-ROM networks.

## 2. Necessary Tools

First of all it is an essential requirement that users should be able to select the desired database from a menu system. However, this menu system does not only have to organize the presentation of menu items, it also has to suppress all the conceptional bugs implemented in nearly any retrieval software you can buy today.

These conceptional bugs are:

- DOS-exits which allow the user to enter the system level of the network;
- unlimited access to all network drives to create and store export files;
- no integrated licence control;
- creation of temporary files in the installation directory;
- very special demands on the system configuration.

In my experience, most retrieval programs contain at least one of these conceptional bugs. Without a management software, adding some functionality and caring of the bugs inside the retrieval software, the CD-ROM network will remain incomplete, especially when designed for public access.

The necessary tools are:

- a shell which deactivates any DOS-exit of retrieval programs;
- a proper access right definition for the network drives;
- a licence control program;
- a timeout routine which deactivates retrieval programs which are still active but not used anymore;
- a multiple installation automatism for programs which cannot be started by more than one user in the same directory;
- a memory manager like DOS 5.0 EMM386.EXE and HIMEM.SYS;
- a dynamic load automatism for all additional drivers necessary to access CD-ROM players.

This refers to DOS based applications. But what about WINDOWS based applications?

Although WINDOWS based CD-ROM retrieval programs do not yet play an important role in the libraries, we have to be aware that more and more CD-ROM developers offer WINDOWS based applications, too. SilverPlatter and DATAWARE have both announced WINDOWS based software for the near future.

Additionally, the multi-media capabilities of WINDOWS offer new ways to present data and facts. Multi-tasking with several applications is WINDOWS standard and opens new ways for professional retrieval.

A WINDOWS based application can only be called within WINDOWS. A DOS based menu system is not designed to call WINDOWS applications, this should be done within WINDOWS. These two different types of retrieval programs are most important for CD-ROM networks. Therefore we have to put the emphasis on them.

While resident tools allow to influence DOS based applications, there is hardly any chance to influence WINDOWS applications in any way.

Therefore, in my own opinion, WINDOWS does not yet offer viable ways to create a central end user interface for public access in libraries.

However, this will change very soon and once the users have got used to work in a graphic environment, they won't return to the DOS text mode.

So WINDOWS will have a strong influence on the existing CD-ROM networks, and for the supervisor of a CD-ROM network it is necessary to be aware of the changes that will come up:

- from DOS to WINDOWS based applications,
- from single to multi-tasking installations,
- from screen to multi-media presentation including sound, video and animation.

At the same time networks are no longer PC networks or terminal networks. We are living in a heterogeneous world where different types of machines have to be considered. Sometimes I have the impression that much more intelligence and money are used to create heterogeneous environments for computers than to create a world where heterogeneous human beings are able to live together in harmony. The results can be seen in Germany and other countries in the hostility and violence against foreigners.

But let's go back to our heterogeneous computer world: Hardware and tools to allow terminal access to DOS applications offer the possibility to build up DOS servers in order to share MS-DOS applications among terminal users.

The CD-ROM network philosophy of our company is, however, that a CD-ROM network for DOS based CD-ROM retrieval programs should be strictly based on a PC network like Novell or the OS/2 LAN-Manager and heterogeneous access for terminals should be just an addition not the only possibility. I believe this because the development in end user interfaces (WINDOWS) and new technologies like multi-media are based on PC hardware. It will not be possible to transport sound to a terminal.

Additionally, the discussion between PC based CD-ROM networks and DOS server based networks using terminals as end user machines is often influenced by the term client/server. A DOS server machine does not create a client/server concept, it is nothing but a host-terminal network. To create a client/server concept it is necessary that the client is intelligent and prepares questions for the server and the server will accept these questions and gives the answers. But we all know how terms are misused in the computer world.

What will happen if WINDOWS is successful and more and more WINDOWS based retrieval programs are available: the network will suffer from network load overkill.

This is the right moment to switch from Ethernet or Token-Ring to FDDI - not just for the backbone, but for node-to-node-communication - and I am sure that this will be a MUST in the near future.

Let us compare CD-ROM access to FDDI-performance. There is a great difference! The hard disk becomes faster, cheaper and bigger at the same time. At the moment something like a renaissance of the hard disk can be observed. Some companies playing a major role in the CD-ROM market (SilverPlatter) now start to offer hard disk based client/server solutions which really deserve this name.

At the same time the high acceptance of CD-ROM in the market has clearly presented the limits of CD-ROM: The existing CD-ROM networks will change to CD-ROM and hard disk based information systems in the next year. CD-ROM will often only be used as a transport medium.

What does it mean for a supervisor who wants to manage successfully a CD-ROM network?

- Consider the CD-ROM network as a platform for information service;
- do not neglect hard disk based applications and mix them with CD-ROM applications;
- take part in the discussion of end user interfaces;
- contact the distributors of retrieval programs and clearly point out the weaknesses of the existing programs;
- learn to integrate heterogeneous access;
- learn to configure secure networks, and if this is not perfectly possible try to think of ways how security could be granted by future systems;
- do not rely on the idea that MS-DOS will die;
- do not believe that UNIX alone will save our souls;
- do not believe that anything will become easier;
- do not believe that some day we will have the common and general interface;

- offer the experience you gathered to colleagues in the library;
- build up a feeling for software and hardware.

## 3. The Dynamic Structure of CD-ROM Networks

The most interesting aspect I see in CD-ROM networks is the dynamic structure of these networks. Monthly updates, changes in the software, new releases always keep the supervisor in a very active state. What is running today can crash after the next update.

The supervisor of a CD-ROM network has a position exactly in the middle between the company which has installed the network and the distributors of CD-ROM packages. This situation is typical for our computer world where more and more parts come from different companies. All these parts have to be assembled by the supervisor. A CD-ROM network is, therefore, a perfect platform to learn what will be going on in the future.

And he or she has to become more and more an information manager, who sees to licensing, charging users, and serving individual needs.

Because of the licence problems the supervisor is forced to become a fee-manager too. He has to determine exactly how many licences are necessary and how to handle their control. Additionally, he has to prove to the distributor that this control works. Nowadays a lot of time is spent on discussing these problems with the different distributors of CD-ROM packages, because the licensing structure of some products is really criminal. For example:

Some licence contracts of CD-ROM retrieval programs claim that as many licences have to be payed as PCs are connected to the network even if you have installed a licence control which only allows 5 users the simultaneous access. The distributors claim that the value of the package in a network increases and all users have potential access. They are right, but they forget that this increased value that comes up with the network is an investment payed for by the customer.

A network can be compared with a transport system. How would a distributor charge the licences in the following case:

Let's imagine that we have a library which is a 1-km-long building. Inside this building several rails are installed on which there are tables with computers and local CD-ROM players. In each CD-ROM player there is one CD-ROM package, on each PC only one software is installed, some packages are installed in 2 or more PCs.

The users of this library will sit on chairs along this 1-km-railway. They have buttons to select the database they want to work with. The system now checks whether a table with a PC containing this CD-ROM is free and if it finds a free table then it will send this table to the user via the railway.

In this system theoretically 1000 users can work. Everybody has the chance to work with every database. Some databases are multiply available, for instance five times.

I'd like to ask: How can you charge the licences for this equipment?

The answer is clear: As many licences should be charged as PCs with the same CD-ROM retrieval program are available.

The second question is related to the difference between this railway system and network.

The answer is: There is no difference; a network is nothing but a transport system.

I think the discussion about licences within a network can be brought to an end by giving this example. Licences based on the number of PCs connected to a network are criminal because they charge the library for its own investigation. Licences can only be based on the number of possible simultaneous accesses.

I'd like to talk about the consequences for a supervisor who wants to manage successfully a CD-ROM network: He/She

- must learn to face with different programs;
- has to learn to discuss licence contracts with the distributors;
- should never believe that a network is ever finished;
- must try to understand the job mainly to minimize problems;
- shall not run mad when some problems still remain unsolved.

## 4. Consequences

The supervisor of a CD-ROM network (and any other network) has to be a professional. He/She has to have the following capabilities:

- endless patience;
- incredible know-how;
- enormous flexibility.

I have never met such a person. But I have met a lot of people who, once the CD-ROM network had been installed, became network "gurus" with a very good knowledge and who regard the CD-ROM network as starting point of their career.

The development of new information distribution systems will go on. Systems will change and the dicussion about the best solution will never end.

And one day we will have **CYBERLIB**, the library in cyberspace, where users don't use screens or keyboards any more, but work with cyber-helmets and navigate using data-gloves to work through the data and information provided by the library. Then the users might find the Proceedings of the Essen Symposium in their library and maybe they will laugh a little bit about our efforts to discuss the problems of CD-ROM networks, but I am sure they will find that we all did our job quite well and that the first steps to global information networks were successfully managed by the supervisors.

# CD-ROM Network as a Component of an Integrated Information System

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# CD-ROM Network as a Component of an Integrated Information System

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## Abstract

At first the many advantages of CD-ROM are described followed by its main applications. Differences between use of printed material and CD-ROM are explained, and many of the advantages of the information hierarchies of CD-ROM.

Also presented is the setting of a library information centre where the computer will remain unattended most of the time. CD-ROM and traditional reference tools are compared. The report closes with some statistics on the use of CD-ROM in the United States and Europe.

# CD-ROM Network as a Component of an Integrated Information System

CD-ROM has become a recognized medium for optical publishing of information means. Since 1988 it is in use everywhere in Austrian university and research libraries. The University Library Graz just now uses more than 35 CD databases with approximately 70 CD-ROMs of all subject areas.

**CD-ROM Has Many Advantages**

- large storage capacity
- light weight format for economical shipping
- relatively inexpensive production by mastering techniques
- a great variety of databases
- random data access and
  computer based retrieval and output manipulation
- direct user searches

Main applications have been large bibliographic databases, and other reference tools, and some catalogues of library holdings. There are new topics such as language teaching, business and management informations and full-text CDs. CD-ROM showed that current growth rates in libraries are even greater than industry had anticipated. A European market research study forecasts a growth of CD-ROM at the rate of 600 percent in the next three years, which is interpreted as slow in comparison with more euphoric expectations by industry.

Printed materials provide readers with information arranged in a hierarchy to provide an easy overview of the structure and the extent of information contained there. This permits quick and easy navigation to topic locations. Electronic media provide more fluid and flexible hierarchies or outlines. Small sizes of computer screens limit the view of documents and also make it a little more difficult to get a quick overview of topics. At the same time the computers often allow users to interact with the electronic outline, to expand or reduce it in order to display the desired level of detail. It also lets users channel commands to the lower levels of an electronic outline by selecting the appropriate heading and issuing the command. Other options to represent information hierarchies include nesting menus, vertical or horizontal trees, and nesting boxes in addition to outlines. Each of these methods has its own particular advantages. While keyword searching offers computer users a powerful tool, it does have its limitations. Often the context of information is as important as the information itself. Pure keyword access gets users to a fact, but they often cannot remember how they got there or cannot understand the larger context of the fact.

### Why Put a CD-ROM on a LAN?

The University Library Graz uses the LAN of the university campus - and didn't install an individual CD-LAN. This LAN is an Ethernet, the central computer is the VAX of the EDP-centre. Reasons for implementing LANs are numerous. But certainly one of the most persuasive and often cited reason involves the **economic benefits** received from allowing multiple users to share expensive components (e.g. printers, high capacity hard drives, CD-ROM drives and products). Putting CD-ROMs on large, heterogeneous networks allows older equipment, such as dumb terminals tied to the mainframe, to access this information. What is critical, is the price of CD-ROM products. But the more institutions will use network-CD-ROM-products, the more economical attractive network policies will become commonplace.

### Other general reasons are

### * File / application sharing

LANs make it easy to share files, even across different platforms such as DOS to MAC, or send them to others on the system. This ability forms the basis of the networks electronic mail facilities.

### * Increased data integrity

All users of a central database can have confidence that they all have access to the same information. It is easier to control the input of new data on a network since only certain individuals can receive the authority to update files. Different LAN systems afford more or less protection in this area.

### * Increased security

New LAN systems use increasingly sophisticated methods to ensure control of access to shared resources. This can present an important consideration in a library- and/or information-centre setting, where the computer will remain unattended most of the time.

## CD-ROM and Traditional Reference Tools

A certain number of libraries are locating their CD-ROM workstations in consolidated laboratory areas remote from reference or information service areas. Their reasons for doing so include efficiency gained by having a single area for staff to supervise and maintain CD-ROMs wiring and technical costs, increased accessibility (longer open hours than library hours), and lower security costs. The trade-off made in such installations is the loss of ready-access to related library collections and subject-oriented staff. If a database runs from 1980 up-to-date but the users' research project encompasses the period going back into the 1960s their research will be eased by access to the CD-ROM portions of the index but fragmented by the separate locations of the years covered.

Similarly CD-ROMs provide a valuable research strategy that patrons can use to locate appropriate subject headings in earlier years of corresponding printed tools, but housing CDs in locations remote from the printed collections decreases this utility. The interdependence of the CD and print source again argues for their juxtaposition.

At the University of Graz the networked CD-ROM information system has been opened early this year. It is a co-operative product of the university library and the EDP-centre of the university and it has been the first realization of a CD-ROM network in Austria. The system serves about 600 workstations, PCs and terminals in 100 institutes, faculty libraries, 20 hospital departments and so on, all of them within the campus of the university. At the university library (main library) 6 PCs for CD-ROMs are offered. Broad and thorough tests have been done from November to December 1991.

There are two servers installed - each with 21 CDs - which allow the access to the database of up to 16 users at the same time. In addition, there is a jukebox for 100 CDs, but access is only possible one by one.

The interest in the use of CD-ROMs in the network is increasing.

**Use of CD-ROM (January to June 1992)**

| 1992 | Users | Calls | hours of search |
|---|---|---|---|
| January | 79 | 1.761 | 345 |
| February | 92 | 1.789 | 492 |
| March | 106 | 1.857 | 472 |
| April | 104 | 1.681 | 377 |
| May | 132 | 2.121 | 439 |
| June | 114 | 2.031 | 431 |

To get an idea of how CD-ROM installations in the USA are being configured and administered, the Office of Management Services recently surveyed 73 Association-of-Research-Libraries institutions, and found that 20 of the surveyed institutions have separated CD-ROM areas, 60 had them as part of the reference department. 26 located them where the material is interpreted, 45 had them in separated departmental areas or libraries and seven had them in other locations. 69 of the responding institutions didn't charge for searching, 4 did, and 65 didn't charge for printing on disc, 7 did. Computer equipment can be secured by various means. The survey reports that 12 institutions keep their CD-ROM equipment in locked rooms, 25 keep them in locked cabinets, 35 provide some other forms for security for workstations. 53 of the institutions surveyed keep the discs at a service desk when they are not in use. Running the discs on a LAN makes the largest number of users with the least problem of security. By keeping the discs in a server remote from workstations users on the network can access the discs at will. This is the best case scenario to make discs available to all the workstations on the network.

A study at the University of Graz concerning the habit of CD-ROM users showed the following answers (134 from 150 questionnaires came back):

- users described their search time in the CD network of Graz ranging from 20 to 45 minutes;
- the number of used keywords has been mostly 4-6, sometimes 1-3, and very seldom more than 10;
- the number of hits has been sometimes only 1-10 and mostly 11-30 records;

- most users said, they have learned the CD-ROM usage by themselves with documentation produced by librarians, very few learned it with the help of a librarian;
- results of searches are described in all cases as good;
- categories of users are 40% beginners, 40% average and 20% experts.
- the number of used databases for one question is between 2 and 4;
- descriptions of databases produced by librarians were frequently used for the following databases: INSPEC, SSCI, WISO, Medline, SCI, VIB, Psyc, BiP, Abi-Inform.

There are some special aspects of a CD-ROM network as a component of an integrated information system. As CDs are not bought but leased the printed edition of the index will not be cancelled. CDs are suited best for searches for literature of the last four to five years; for searches in earlier years (till 1965) the online retrieval is the better method; for older material the printed indexes give the best results; license agreements shrinked the free access to information in networks; problems of copyright are an open question for all users.

CD-ROM network is an important component of an integrated information system of every modern university or research library.

## User Education of CD-ROM

More than with any other application of information technology every member of the library service is involved in CD-ROM: from the director with a need to find databases to the librarians on duty and, of course, the end users. There were fears that it would make reference librarians redundant. Instead, this end user's medium is placing demands on staff.

## There are Many Challenges in CD-ROM

- **Novelty** and instant **popularity**: libraries having started with CD-ROM have to continue. Librarians say - once bitten for ever smitten.
- **Visibility**: the use and the misuse of the system is highly visible in comparison with the use of printed sources.
- Knowledge of **information technology**: there will be some experience amongst the librarians and users.

- Range of **software** and up-gradings: can be a problem with printed sources in connection with CD-ROM.
- **Background knowledge:** what does the user need to know about database construction, search strategies, Boolean logic?
- **Impatience** of end users: who will or will not use helpscreens or documentation.
- **Overexpectation** of users: often CD-ROM has the same information as the printed bibliography but in another format. The quality of data does not change but just its accessibility.
- Time needed to **train** staff and users and to produce **documentation:** there is a demand for continuing learning and on-going education.

### Things Users and Librarians Need to Know

- Basic search commands (FIND; SHOW; PRINT);
- some Boolean logic;
- the difference between using descriptors or free text terms;
- whether the CD-ROM is the most appropriate product or other tools would be of more use;
- how the database is structured;
- how to limit a search by years etc., and
- some CD-ROM technology.

It is not only the librarians' job to make users computer literate. A structured introduction in small groups followed by exercise or one to one instruction can be reasonable. A single workstation should not be used to teach more than four people. The main problem will be coping with demand - so be realistic.

Training must involve all staff on public points and in book processing. Access to CD-ROM may not be limited to time when "experts are on duty". Last not least the impact of feedback on CD-ROM products to the producers is one of the library professions successes.

### Statistic Figures of CD-ROM

The importance of CD-ROMs is documented in the enormous increasing international market as shown here:

| CD-ROM Firms/Country | 1989 | 1992 |
|---|---|---|
| N- and S-America | 202 | 1.048 |
| Europe | 112 | 1.223 |
| other countries | 9 | 332 |

| CD-ROM Products/Country | 1989 | 1992 |
|---|---|---|
| N- and S-America | 284 | 1.361 |
| Europe | 89 | 698 |
| other countries | 18 | 212 |

| Most important subjects | 1991 | 1992 |
|---|---|---|
| Leisure time & recreation | 179 | 345 |
| Arts & humanities | 130 | 227 |
| Computer & computer programme | 141 | 215 |
| Medicine & health care | 187 | 197 |
| Science & technology | 165 | 185 |
| Business information | 141 | 177 |
| Libraries & information science | 92 | 148 |

These figures let us know that all our activities in libraries with CD-ROMs are of great importance. They are one step further towards bringing more variety into the library information scene, to give users and librarians additional possibilities, and to find solutions to their numerous questions.

## Literature

Böllmann, Elisabeth (u.a.): CD-ROM im Netz an der Karl-Franzens-Universität Graz. In: Online-Mitteilungen. Nr.42 (1992), S. 11-14. (Mitteilungen der Vereinigung Österreichischer Bibliothekare. 45 (1), 1992.)

Böllmann, Elisabeth (u.a.): CD-ROM in der Universitätsbibliothek Graz. In: Cogito. Jg. 8 (4), 1992, S. 44-47.

CD-ROM. Local Area Networks: a user's guide. Ed.by Norman Desmaris. Westport: Meckler 1991. 131 S.

CD-ROM Applications and markets. Ed.by Judith Paris Roth. Westport: Meckler 1988. 147 S.

CD-ROM Licensing and copyright issues for libraries. Ed.by Meta Nissley and Nancy Melin Nelson. Westport: Meckler 1990. 95 S.

CD-ROM-Netze in Bibliotheken. CD-ROM Networking in libraries. Vorträge und Diskussionen. Proceedings. Internationales Kolloquium. International Conference. Bielefeld, 1992. 286 S.

Desmaris, Norman: The Librarian's CD-ROM Handbook. Westport: Meckler 1989. 174 S.

Neue Medien. Zahlen dokumentieren Wachstum. In: Cogito. Jg. 8 (4), 1992. S. 48-52.

Oberhauser, Otto: Multimedia information storage and retrieval using optical disc technology. Potential for library and information services. Wien: Österreichisches Institut für Bibliotheksforschung, Dokumentations- und Informationswesen 1990. 152 S. (Biblos-Schriftenreihe. 151.)

Obst, Oliver: Der Einfluß lokaler CD-ROM-Netzwerke auf wissenschaftliche Bibliotheken und ihre Benutzer. Dargestellt am Beispiel der Datenbank MEDLINE. FHBD Köln, 1992. 9 S.

Price, David J.: CD-ROM Networking Developments amongst the Oxford Libraries. In: Innovation for information: International contributions to librarianship. Festschrift in honour of Dr. Ahmed H. Helal. Ed. by Joachim W. Weiss. Essen 1992. S.183-196. (Veröffentlichungen der Universitätsbibliothek Essen. 16.)

Reinitzer, Sigrid: CD-ROM im Netz der Karl-Franzens-Universität Graz. In: Fakten, Daten, Zitate. Das Informationsangebot für Wissenschaft und Wirtschaft. Jg.11 (3/4), 1991. S. 1-3.

Reinitzer, Sigrid: CD-ROM-Netze in Bibliotheken. Internationales Symposium in Bielefeld im Febr.1992. In: ABI-Technik. 12 (2), 1992. S. 138-140.

Reinitzer, Sigrid und Franz Kroller: Vernetztes CD-ROM Informationssystem an der Universität Graz eröffnet. In: ABI-Technik. 12 (2), 1992. S. 127-137.

Schmeikal-Frey, Bettina und Tina Salhi: Datenbanken auf CD-ROM an österreichischen wissenschaftlichen Bibliotheken. In: Fakten, Daten, Zitate. Das Informationsangebot für Wissenschaft und Wirtschaft. Jg.11 (3/4), 1991. S. 4-12.

Schubert, Burghild: Qualitätsanforderungen an die Retrievalsoftware von CD-ROMs. Eine Analyse. Vortrag, gehalten am Deutschen Dokumentartag, 22.-25.Sept.1992, Berlin. (Im Druck)

Vasi, John u. Cheryl LaGuardia: Setting up CD-ROM Work Areas-Part 2: Integrating CD-ROM functions into library services. In: CD-ROM Professional. Vol.5 (3), 1992. S. 38-43.

# Online Public Access Catalogs Serving Users in an Electronic Library Environment

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# Online Public Access Catalogs Serving Users in an Electronic Library Environment

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## Abstract

In an electronic library environment online access to information becomes a valuable research tool and tends to increase in demand over the next future. As a result the academic community will ask for an integration of library catalogs with other information resources: databases covering the literature of special fields, databases covering statistical data collections, current contents services covering periodicals, non-book materials ranging from computer files to archive materials, full-text databases, and so forth.

An online access tool providing this vast range of information will be linked to holdings informations not only of the library that offers the service but also of other institutions elsewhere. Library catalogs will thus migrate from being a census for the collections to an academic research tool far beyond the borders of our present cataloging standards and the way we work using them.

The paper will discuss the impact on cataloging standards and bibliographic data formats and will point into the direction of a new cataloging environment with different access points according to the information requirements of the users. The present subject headings and classification schemes used to index library material have to be considered obsolete. The aim must be the integration of existing thesauri accepted and used by the academ-

**ic community by utilizing a "meta language" as a software engineering tool. This "meta language" will offer access points by means of different facets focusing the information stored, and these facets will be interactively selected by the user supporting the demands of his academic field and retrieval practice.**

# Online Public Access Catalogs Serving Users in an Electronic Library Environment

## Introduction

In an electronic library environment online access to information is one of the key functions that libraries have to offer in the future. It will be the first and most important access point to library services and thus its characteristics in a changing library environment will have to be considered seriously.

Online public access catalogs have been developed to replace card or list catalogs and to enhance the access to information stored in the library by using the benefits of processing machine readable data. They will elaborate to a valuable research tool and thus migrate from being a successor of library catalogs to a networked gateway to vast information resources. It is not a visionary perspective but reality in some library networks today: bibliographic databases covering the holdings of one library are connected to databases covering regional library systems, access to holdings are processed electronically, interlibrary loans provide physical access to material from other libraries. The barrier between monographic literature and journal literature has been broken down by integrating databases providing access to articles in scientific journals through specialized services like MEDLINE or CURRENT CONTENTS. Furthermore, networking of academic institutions world-wide provide access to specialized research-oriented databases of various disciplines mounted on campuses without any direct connection to the holdings of the patrons library. Today, all this information is “at the fingertips“ of the academic community, even without a certain library interface. The goal should be the integration of these sources of research activity and the publications of academic communications.

On the other hand, library networks do begin to open their bibliographic databases to other than traditional library materials. Museums, archives, and computer files, to only mention a few, are considered relevant sources to add value to existing databases. This material is cataloged using the same data structures and cataloging rules with some extensions and modifications if necessary. Up to now, the user must be informed beforehand about the kind of information available in the OPAC, he must perform distinct decisions by choosing a database or by using distinct search strategies and access points to retrieve the information he wants. The future OPAC will have to guide the user towards the information without asking him the database he wants to search: The user in an electronic environment will not want to know the database of his choice, he will want to scan all relevant sources in one session.

## The Problem: The Dinosaur of Information Resources Provided Electronically is Devoid of Hat and Leash

Consider the scenario: Library catalog, library network union catalog, bibliographic databases on journal articles in a variety of disciplines, databases of research-oriented information like statistics, facts on chemical structures, databases covering archival material relevant to historical research, databases providing access to geographical data, maps etc. in great detail. This is all on our campuses today, but only part of the academic community has access to it. There are several reasons for this:

1. Today, library automation is at the beginning of a new phase in catalog development, technically and logically. We are still not aware of these very special resources, we still have to integrate the more common bibliographic databases into one interface design of OPACs. Thus, librarians may have other projects to work on in the moment, but the goals of developing the library interface of the future can be described: union catalogs of regional networks support automated ILL-procedures, databases covering journal articles link to holdings records of the journal, providing online access to the information or download functions in at least a considerable subset of journal literature, interface design is directed towards an intelligent processing of users requests covering the differences between indexes and retrieval procedures of the variety of databases by providing a unique user interface and a searching assistant supporting interactive user instructions.
2. OPACs are still devoted to library material in the first instance. To turn the attention towards other materials is beginning to become a trend amongst existing bibliographic utilities.

3. Specialized databases cover facts rather than information stored in common library media. These facts are valuable only to users accustomed to the structure and information of this material. There is no link between the information stored in these databases and the academic communication of these disciplines e.g. in articles or monographs. But, of course, academic communication makes use of this information if research is published. A collection of facts may perhaps not being stored in a database but in another not indexed computer file to make access even more complicated.
4. These specialized databases and sources of information are designed to be exclusive tools for the research in a particular field. Nothing is provided yet to open this material to a wider academic community.

The first two reasons describe the librarians manner to use catalogs. In the future, catalogs will definitely migrate from being an inventory for holdings towards research tools, gateways to a vast range of information. Thus, the design of interfaces for OPACs has to consider this in the future. OPACs should be able to perform search results appropriately customized for each patron.[1]

The latter two reasons have to be complemented: University and faculty may not want to give these databases out of their house for several reasons. But it is likely that after research projects have been developed and established, this kind of data will be considered library material in the future.

## Interface Demands for OPACs in an Electronic Library Environment

1. *Provide a unique retrieval language or procedure for all databases accessible.* The user should not be forced to decide where to search for an information. He should only be informed about information accessible in the library itself, information that has to be requested from elsewhere via interlibrary loan or information that is stored in electronic form and requires some sort of technical or electronical equipment to use it. The interface must provide an interpreter between the different databases, their different data structures and command languages to provide its users with information available in these databases and integrate this information into a coherent whole.

2. *Guide the user towards an optimization of retrieval strategies.* Make use of both bibliographic instruction and automated optimization procedures. Bibliographic instruction as offered by libraries is subject related and devoted to the interdependence between publication forms and specialization of information. Optimizing retrieval strategies must improve the output quality by reducing redundant information, rating the hits by their level of specialization, and performing what-if-analyzes of the hits by intelligent software to provide a "relevance gauge". As an example for this you may look at CD-ROM-interfaces by ARIES, the Knowledge Finder software, which classifies the hits by providing a gauge meter for the possible relevance.

   What-if-analyzes implemented into the user interface may guide the patron to reduce the number of hits thus increasing the relevance of the material found.

3. *Analyze the search strategy of the user by matching searches with authority files.* The search strategy of the user may not be a strategy at all, but with typing in a request, the user indicates more than just the search terms. Combined with demand 2 above, the interface may figure out the field, the user may be interested in, the dependency of subjects or fields according to the depth of information required to improve searches covering interdisciplinary problems, and may offer a guideline to analyze the hits for a first sight classification. The procedures have to be looped, because in most cases users will not be able to estimate the hits of their first retrieval. The larger the databases are the larger number of hits will be offered to the patron. This is the step where a second loop must help to reduce the hits to form a subset relevant to the user and thus the user may estimate its quality. Afterwards the user may be able to improve the quality in a next retrieval step by using additional search terms or strategies.

4. *Provide a structured search term browsing list - a thesaurus like authority file integrating the databases offered - tailored to the users demands by analyzing events in step 2 and 3.* To assist the user in navigating this array of information browsing should be supported by a structured, hierarchical thesaurus. Authority files in use for subject headings are the basis for this demand. No such file consists of mere subject headings, there can always be found a hierarchical structure underneath. If the subset of hits has been reduced by processing steps 2 to 3, browsing through a list of subject headings linked to the

remainder material can improve the result of the users retrieval. If the patron will reach this step and not leave the terminal annoyed, he will be guided through the rest of the spectrum of information provided by the host. The interface can analyze the spectrum of subject headings combined with their hierarchical dependencies to further enhance the reliability of its classification: after this step, the user can be classified according to his skills and according to the disciplines he is interested in. Furthermore, the interface can detect whether interdisciplinary searches cause problems because the user is familiar with the terminology in one field but lacks this skills in the other.

5. *Provide intelligent access tools for the experienced user.* Experienced users - scholars and researchers as well as graduate students - will ask for more than library holdings information. It is likely that experienced users can formulate search strategies with the background of their discipline. If OPACs serve as gateways to the vast array of information described above, the experienced user will need further attention. This user may need an additional interface mode as a search assistant, a software tool providing him with classification-like access points.

Technically, the advantages of the client-server-model enable the realization of at least parts of these requirements. As Denise A. Troll quotes it regarding the Mercury Project at Carnegie Mellon University Library, "desktop interfaces, depending on the screen real estate available, can provide simultaneous access to multiple, interactive views of the information [...]. For example, using windows, a workstation interface can simultaneously display the search history, a list of terms in a database index, a list of titles retrieved, and a bibliographic or full-text record. All of these views can be used to create new searches or modify old ones."[2]

## What is the Basic Information in the Data Structures the Interface Can Use for Analyzes?

If a user interface is written to solve the problems listed in the requirements just stated, the software will need a set of rules to use for decisions. Besides these rules, which can be coded as artificial intelligence, it will need a set of informations to match against the searching behavior of the user in front of the machine. This set must be derived from authority files provided for subject access to the bibliographic databases, but it has to be the integral part of the system. With the exception of those classes of data I mentioned in my introduction as being non-bibliographic, there are sources to derive subject headings authorities, the yet unsolved problem is how to integrate them to become a coherent whole for the entire set of databases or data offered. Will it be possible just to mix the different subject heading records into one index by any kind of automated procedure? The least difficult way is found if the subject heading records would have a field pointing to a classification or vice versa. This would help to form subsets of headings belonging to the same classes and to process links between different classes with overlapping terminology. It would furthermore enable to generate interdependent links between subject terms and classification schedules.[3] Enriching catalog records with terminology of classification schedules will provide another important facility: if classification schedules and search term enrichment are achieved by generating links between authority and title records, it should be possible to use classification schedules translated into different languages to provide users with access points in their mother tongue. Again, utilizing classification schedules this way has an impact on the usage of classification in libraries. "Can we divorce shelf arrangement as a process from classification as a subject access process so that we can create useful, systematic browsing displays online which would provide a helpful order of items, avoiding the problem of the inherent order or alphabets?"[4]

The basic information that the interface knows about the requirements of the users is of course the user input itself. The search terms the user keys into the keyboard have to be matched against a structured vocabulary derived by implementing subject headings authority files and their hierarchical interdependence. The interface will match the search terms against its authority file and will get information about the disciplines the subject heading is used in, the hierarchical level, the narrower, broader, used for etc. dependence, and it may find information about the distribution of the hits between the analyzed fields or disciplines. Still on a very simple basis, the first set of records the user has retrieved can be ordered and classified according to the analyzed hypothetical area of interest.

Analyzes of the users actions when browsing through their first retrieval sets may obtain additional information to process.[5] The interface must therefore provide an interactive browsing tool. If, e.g., the user browses a while through the material presented and ignores quite a number of the first hits, the order of their relevance may not be right. In this step supporting browsing through a structured vocabulary in addition to the hits may guide the user to a more appropriate and more precise description of the problems he looked for. Interactively the interface software will guide the user to make further decisions and so might increase the quality of the search.

I want to direct my ideas to an interface for a library online catalog as a research tool. A user who has to intensively find, filter out and react to information provided in the media we discuss in electronic library environments, will of course want to improve the quality, the reliability, and effectiveness of his searches and he will definitely judge the quality of the instruments the library offers.

## The Challenge is Non-Bibliographic Material

To begin with, integration of material into bibliographic databases, which is not bibliographic at first sight, will need special indexing procedures. As an example I will discuss archival material consisting of a correspondence and a large amount of photographs. This material should be offered as resource for the academic community by integrating it into an existing bibliographic database. Let us assume, that the data structures used in the database can be adapted to this material, the problems are the access points and thus the cataloging rules and authorities available.

A collection of letters exchanged between two scientists can only be described very formalistic according to existing rules and data structures: Access points would be the names of the corresponding scientists and the dates of the letters if available. All further access points require that the catalogers reads the letters, classifies the contents - he should be a specialist in the field - and enters subject headings according to his analyzes. On the other hand one could take key words out of the context of the letters and use them as access points, but some loss of information will occur. So it will be very important to use authority files for subject headings which are agreed upon in the very discipline or which are library authority files covering this discipline. A controlled vocabulary is the most effective access point in this case. Furthermore, the material should be indexed using classifications like UDC which are widely and internationally used. The latter provides an access point for matching subject heading authority files in other languages.

With the photographs as with every visual material using subject headings to index is a poor alternative, because the indexer cannot judge the relevance of the used terms as easy as by using a classification tailored for visual material. A classification may guide the user and the indexer to use terms by providing an array that has hierarchical interdependencies.

To conclude this aspect, both worlds have to be merged, subject headings and classification, to provide a consistent database to the user even if he is not an experienced art historian who would easily find what he is looking for via an iconographic classification. But consider interdisciplinary research, where this may not be true to the same extent. You may want to ensure that the material provided by the databases can be retrieved by everybody in high quality retrieval results, otherwise the break even point between the efforts to be made in cataloging these materials and the costs of the projects will not be very economical in the total. To focus on costs, one may consult the report of Sue Beatty on the impact of subject enrichment procedures on workload and resources in a special library.[6]

## The Retrieval Assistant

Experienced users should be supported by a retrieval assistant which should be part of the intelligent user interface. It should offer hierarchical, classification-like access points in very early steps of the session. If an experienced user starts his searches through a certain window, say class, the interface gets valuable information to guide him through the array of databases available. Starting at the level in the hierarchical branch the user has choosen, the procedures described earlier may result in a better quality of retrieved information and vice versa a considerable reduction of noise.

A classification may also guide unexperienced users in certain fields or disciplines to get information relevant to them. The key function of the intelligent interface, however, will be provided by links between classification and subject headings stored in thesaurus-like authority files. This is, for my opinion, the most important feature on the way to a seamless access to information stored in networked databases of electronic library environments. It may be supplemented by enriching catalog records of bibliographic databases[7], but this will not be sufficient, if it is the only enhancement provided.

## Is the Intelligent Gateway to Networked Information Still a Vision or Can We Describe Pragmatic Steps on the Way to its Realization Today?

1. Projects to integrate other types of data into existing databases or to add other databases to an existing array should emphasize the question of subject cataloging and access points in the view of a coherent whole of information accessible.

   Existing subject heading authorities and new additional controlled vocabulary should be firstly linked together to provide easy access. Then indexing of data records will provide links that can be used via the authorities to match the search terms in ways I discussed above.

2. Existing databases with integrated subject access systems should be linked or added to bibliographic data by integration of the subject headings authorities and additional classification. It is not necessary to merge the databases to build a new one, but some integrative index to be used for all databases is essential. This index must provide pointers to the databases and will presumably use software engineering tools like meta languages.

3. Databases or data collections other than bibliographic have to be analyzed according to stored information that can be used as access points. An easy example would be a collection of text in machine readable format. Even if this collection is not indexed to form a database, you could match the key words stored in the text with subject heading authorities and provide links between unstructured key words and structured thesaurus-like access points. These variety of data collections will need extensive indexing with a classification, if there is only a poor set of key words available. This work can be done in a considerably amount of time, all other - and of course better - strategies require indexing by people who are specialists in the disciplines covered.

4. The interface may of course not bore the user by endless interactive decision trees. Most of the decisions have to be made internal. Interactivity means displaying rated hit lists and parallel to these and linked to them a subject heading browsing list as a navigator through the terminology used as access points. Experienced users will perhaps want to start their searches via classification-like access to reduce time consuming browsing and filtering out irrelevant information because of overlapping terminology.

5. Standardization of the interface relating to data structures and processing that have to be provided is required to make a transparent use of database services on international networks possible.

**References**

1 Stefanie A. Wittenbach: Building a better mousetrap: enhanced cataloging and access for the online catalog. In: Advances in online public access catalogs. Vol. 1. Ed. by Marsha Ra. Westport, London: Meckler, 1992. P. 89.

2 Denise A. Troll: The Mercury project: meeting the expectations of electronic library patrons. In: Advances in online public access catalogs. Vol. 1. Ed. by Marsha Ra. Westport, London : Meckler, 1992. P. 117 f.

3 Karen Markey Drabenstott, Anh N. Demeyer, Jeffrey Gerckens, Daryl T. Poe: Analysis of a bibliographic database enhanced with a library classification. Library Resources & Technical Services 34 (April 1990) 180. See also: Classification as an enhancement of intellectual access to information in an online environment. Cataloging & Classification Quarterly 11,1 (1990) [whole issue].

4 Pauline A. Cochrane: Classification as an online subject access tool: challenge and opportunity. In: Pauline A. Cochrane: Redesign of catalogs and indexes for improved online subject access: selected papers of Pauline A. Cochrane. Phoenix, AZ: Oryx Press, 1985. PP. 379-380.

5 Library Information System II: Progress Report and Technical Plan, Mercury Technical Report 3, Pittsburgh, PA: Carnegie Mellon University, 1990.

6 Sue Beatty: Subject enrichment using contents or index terms: the Australian Defence Force Academy experience. In: Advances in online public access catalogs. Vol. 1. Ed. by Marsha Ra. Westport, London : Meckler, 1992. PP. 99 f.

7 MARBI Discussion Paper No. 46: Enhancing USMARC records with table of contents. In: Advances in online public access catalogs. Vol. 1. Ed. by Marsha Ra. Westport, London : Meckler, 1992. P. 105.

# *ALEPH* : Being Part of a Global Information Universe

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## Abstract

**Fully conscious of the objectives and requirements for making all levels and types of information globally and instantly accessible, *ALEPH* has developed or is currently developing a number of features to meet this goal. Among these features, as summarized below, are standard common user interface (UI) and query language (QL), a graphic UI based on X-Windows, access to a world-wide web (WWW) browsing system and introduction of the Z39.5 communication standard.**

# *ALEPH* : Being Part of a Global Information Universe

In the world of information there are two major axioms:

1. The information world will always be based on a heterogeneous environment based on different record formats and operating on different platforms.
2. Users all over the world prefer and appreciate a consistent and common user interface (UI) to all information applications.

The above mentioned two axioms seem to reflect a conflict. They do not. On the contrary, they are the fundamental stones upon which the whole design and development of the *ALEPH* program is based.

The solution is achieved by basing the development of *ALEPH* on the following two elements:

1. Develop and maintain an OPAC UI which is based on a standard UI and a standard query language (QL).
2. Link the *ALEPH* system to common standard "browsing systems". The standard "browsing system" is linked to different databases while providing a common UI to the different applications which are interfaced.

## I. *ALEPH* OPAC UI

Traditionally, especially for the last five years, *ALEPH*'s development has been committed to adhering to ISO standards. This commitment insures a standard approach by *ALEPH*, that, if followed by other software vendors, can provide a standard application interface.

Examples of this *ALEPH* commitment are:

A. **Common Command Language (CCL) based on ISO 8777.**

*ALEPH* fully supports the ISO 8777 standard command language, which includes a "full-text retrieval" language, in parallel to the traditional browsing of the authority files.

Right and left truncation, masking of characters, and proximity search are some among the many features provided by the ISO 8777 standard.

Using this standard provides the traditional library catalogs with search/retrieval facilities which were traditionally part of database systems.

### B. Multilingual capability based on ISO 8859.

The *ALEPH* UI supports different languages of conversation, which includes multiple complete sets of screens, help screens, commands and error messages for the user. Based on the ISO Latin 2 (8859 standard), data can be entered and displayed according to different character sets. For example, besides the extended Latin character set, Greek, Cyrillic, Arabic and Hebrew are special character sets supported by *ALEPH*.

### C. Graphic UI (GUI) based on X-Windows.

The GUI is part of *ALEPH*'s present development. This UI based on X-Windows will provide a standard presentation of *ALEPH* to all those who are used to the X-interface.

### D. UNIX System V release 4.

*ALEPH* is operational on the UNIX System V release 4 operating system. This environment is a standard open environment, which leads not only to a platform independent application, but mainly to the compatibility of *ALEPH* with all the UNIX standards.

## II. Link of *ALEPH* System to the WORLD-WIDE WEB (WWW) Browser

Although it is quite obvious that developing a UI and a QL according to international standards provides a common approach to the *ALEPH* System, this track of development is a multivendor dependent one. That is, only if other software application vendors will provide their users with the same international standards, a common UI to all different applications can be reached.

To avoid this multivendor dependency *ALEPH* adopts in parallel a second track of development:

Integrating *ALEPH* OPAC to international browsing systems, such as WORLD-WIDE WEB (WWW), thus enabling users who are using a global standard UI to search in *ALEPH* through the WWW browser.

The WWW system is a browser based on Hypertext, in which links between pieces of text mimic human association of ideas. The reader starts with a page including a basic menu of all options (application available). Among the available options (phone book, weather, ...) there is the *ALEPH* Library System in CERN. By selecting *ALEPH* the user will immediately get the *ALEPH* main menu screen for OPAC. Pressing ENTER near each of its options will invoke an *ALEPH* command to start a search. Finding a document will result in a document display on the user home terminal. Each word which is Hypertext linked is highlighted and by pressing ENTER near each of those words a word search in *ALEPH* is initiated and the user gets all records relevant to that word.

The WWW architecture involves:

1. The WWW client - the end user station
2. The WWW server - serving the application
3. The application server - *ALEPH* Library System or any other application

The WWW clients are built on a common core of networking code for information access. This core provides access, using widely deployed internet protocols such as:

- File Transfer Protocol - FTP
- Network News Transfer Protocol - NNTP
- Access to mounted file systems.

## Summary

Integrating *ALEPH* to the WWW system provides a tool for all users connected to the WWW to search in *ALEPH*, using their own standard UI.

Introduction of the Z39.5 standard to the *ALEPH* System will provide an additional tool to all *ALEPH* users to communicate with different library systems, using their own *ALEPH* language.

For *ALEPH*, being part of a global information universe, it is an essential factor of its development philosophy.

# Service and Self-Service : The Electronic Library from the User's Point of View

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## Abstract

Electronic technology should not be used for its own sake but to serve users. In the academic world, students are likely to make much increased use of self-instructional materials of various kinds as student numbers expand without a parallel increase in total university resources. Libraries should be centrally involved in the development of integrated learning resources. The problem of student textbooks in heavy demand could be solved by mass-produced optical cards. Other books may be produced on demand at service points, which may and should include libraries. Types of user need are for access to specific items, searching for material on particular topics, updating, and browsing and serendipity; all of these will be affected by technology. Libraries must aim to be totally self-explanatory and self-usable; so must the electronic databases of references and full text to which they provide access. Librarians need to become information resource managers and providers, giving a more direct service to users than they do now.

# Service and Self-Service : The Electronic Library from the User's Point of View

The literature is full of writings on the future electronic library - the "virtual library", a library without walls, a system that is dependent on electronic access to literature held remotely, accessible to anyone with the equipment (which every self-respecting user will have on his desk if not at home). There will, we are told, in a few years (five or ten or twenty or whatever - the time-scales are vague) be few printed materials, and those will be mainly for home use. We are further told that this will suit everyone much better than today's cumbersome systems, where much material is not available when and where it is wanted, and where there are various restrictions on its use.

It is easy to get carried away by enthusiasm for what electronic technology can do for us. We all know how we quickly get dependent on things we never knew we wanted until we had them: six or seven years ago I never felt the need for a computer, a copier, a cordless phone or a fax machine at home, and this is not just because I had access to these things at work. Now I wonder how I ever managed to exist without them, for purposes unconnected as well as connected with my consultancy and editorial work; my wife uses them too (she has her own computer, and I have two plus one palm-top). But I have also acquired gadgets that I have hardly used at all; I have been gullible enough to buy them because they looked as if they might be useful, and because like many men I have something of the small boy's love of technical playthings.

Likewise, we are constantly bombarded with advertisements for new machines that will transform our professional lives. The emphasis is almost always on what they can do, not on whether they actually serve anyone's needs, or whether any needs exist that they might serve. We need to be careful when predicting an all-electronic information world. In the first place, what audiences are we thinking of? I personally find it very hard to imagine elderly people, even of the next generation but one - today's children and teenagers -, reading novels on screens as a general practice. There is simply no point in it when paperbacks can be mass-produced simply and cheaply. I *can* however imagine people who are poorly sighted using electronic versions the print of which can be expanded or given greater contrast to meet the individual's requirements; and of their using CD systems that combine "printed" text with the same text spoken. There are many other possible applications of electronic technology to the everyday world of leisure pursuits and other activities such as shopping. What we need to do is to identify the various needs and match them to appropriate media - not necessarily one need to one medium, since the same matter can be made accessible in various forms to suit different types of use and different preferences.

I assume that we are discussing at this symposium *academic* users and *academic* needs. However, the same approach of matching media to needs and matter can and should be applied; and this is what I intend to do here. There is no point in talking about the service libraries should offer unless we know what services users want. But first I must start with the observation that in the future the vast majority of *all* information media will at some time pass through an electronic form, in which form it can remain or from which it can be transformed into other forms such as print or sound or pictures. I compared this some years ago to a chrysalis which either remains as a chrysalis or turns into a butterfly in due course. One might extend the metaphor by adding the caterpillar stage - the original input from the author (or composer or illustrator). It was not in fact an ideal metaphor, since the electronic chrysalis, unlike the real one, can turn into different kinds of butterfly, and can moreover stay a chrysalis however many butterflies it turns into.

Let me start with students and their needs, since this is what universities were originally created to serve, and what they are still expected to make their priority; otherwise they would just be research institutes. University libraries, whether virtual or otherwise, that served only research interests would be failing their universities. Methods of teaching students differ considerably from country to country. In all countries universities use a combination of lectures, seminars and self-instruction, but the balance between teaching and learning varies; British and American students are expected to do a lot of learning for themselves, whereas in most of continental Europe they are taught by means of lectures and lecture notes. Their use of libraries varies accordingly. When conducting a study of Nordic academic and research libraries last year I was surprised to note how little many libraries were used by students, in Sweden and Norway in particular; it seemed that it would have made little difference to the students if there had been no libraries at all.

This situation is unlikely to continue. All over the world governments are increasing the proportion of young people going on to higher education. This expansion will impose an impossible strain on public finances unless expenditure on teaching can be reduced, since lecturers account for the biggest slice of academic expenditure. This can be achieved only by much more emphasis on self-instruction. Up to now self-instruction has meant a heavy dependence upon books and journals - in the humanities and social sciences, more on the former than the latter. Technology now offers a solution that combines the use of published literature with interactive learning. The British government has sponsored a *Computers in Teaching Initiative* - which would in fact be more properly called a *Computers in Learning Initiative* - the aim of which is precisely to explore how far this solution can be achieved. Other countries are equally interested in such initiatives, including Sweden and Norway. We may be able to contemplate a future situation where, instead of libraries and other learning aids supporting teachers, teachers support learning aids. We are not in a position to realize this yet, because there is simply not nearly enough "courseware"; but it is growing, and much of it is being produced by university teachers, who may well find themselves spending as much time preparing courseware as in direct teaching; there may come a time when they spend only a small part of their time on the campus. Electronic learning aids will incidentally break down the barriers between universities, and between them and the outside world, since they are (at least in principle) easily accessible at any distance.

There is in these developments a great threat, and a great opportunity, for libraries. On the one hand they could become more and more marginal to students as more sophisticated learning aids come into being, if they come into being outside the library. On the other hand, it makes a great deal of sense to think in terms of an integrated learning resource which includes the library. Indeed, the library should be at the centre of such a resource, for two reasons - the library already is the main learning resource in the university in terms of size and status; and it has at its disposal more of the skills required than any other unit in most universities.

My vision is actually wider than this: it is of the university library as part, if not the nucleus, of an Information Nerve Centre, controlling not only learning and research information resources but administrative information, on the model of the information management centres into which many information units in industry and commerce are developing. Such a centre and its director would be in an immensely powerful position in the university, and the library element of it could benefit accordingly. However, we are concerned here largely with information resources for staff and students.

Students need, as well as access to whatever interactive resources there may be, access to some books for the whole or a large part of their courses, and to other library materials for occasional use, for example an essay on a particular subject that a whole class is required to undertake. The provision of such books in sufficient numbers has always been a huge problem for academic libraries, and with the increases in student numbers it is getting much worse. It may or may not be reasonable to expect students to buy their own copies of some books, though there is a limit to what they can afford even if they were prepared to spend much money on books; it is quite impossible for them to buy books that they want for only a short period. Libraries generally attempt to deal with the problem by acquiring three or four copies of the books in question and letting them be borrowed for only a very short time or restricting their use to the premises, but this is far from an ideal solution.

The problem arises because books are expensive. Technology offers the prospect of cheap books, in the form of credit-sized optical cards, each capable of holding the contents of more than the average book, so long as it is not too heavily illustrated. (See Feldman's excellent report on *The emergence of the electronic book*[1]). Once the master is made, production is extremely cheap. With large sales, cards containing textbooks could be sold for as little as a dollar apiece, including marketing and distribution costs. Readers for such cards already exist in prototype; they are little bigger than most books, and might if they were mass produced sell for no more than 100-150 dollars. It would pay universities to issue every student with one free. The cards would be bought by students, not held by libraries - imagine controlling the storage and loan of thousands of cards - but they would help libraries by relieving them of a longstanding financial and administrative burden. And there is no reason why libraries should not sell them.

The needs of students for recorded knowledge - as distinct from interactive learning materials - will not all be satisfied by optical cards. Other materials to which they will need access overlap with those wanted by researchers and staff; we can therefore consider them together. I do not believe that most books will be amenable to electronic storage and manipulation for everyday use for the foreseeable future; the printed book is a very convenient object, and there is simply no economic or practical point in trying to find substitutes for it in most cases. For this reason, if for no other, statements about the coming death of the library seem to me wildly premature. When we read about the "virtual library" writers are generally referring to journals rather than monographs. However, there is the opposite problem to that of the student textbook: that of the book that constitutes a valid contribution to knowledge but that has a small market. Economies of production have made it possible to publish books in editions as low as 300, but many worthy volumes must have been rejected because of small estimated markets. One way round this is to produce books directly from remotely stored electronic versions at service points, which could be bookshops or libraries; the user could have a book printed before his eyes, bound and handed to him within perhaps half an hour. Libraries could of course get books produced in this way to add to their stock as well as for their users; they would need to judge how much if any subsequent use was likely, and whether it was more economic to add it to their stock or have it printed out again if and when the next person wanted it.

That still leaves libraries with the responsibility of providing large numbers of books to serve their users. In future they might perhaps acquire electronic versions, if the computer-set text is converted to a form that can be used for retrieval by the application of SGML (Standardized General Mark-up Language) and if publishers are prepared to let libraries have copies; but they would be generally be reluctant to let such versions out of their hands, since this could deprive them of subsequent sales. In any case, users would not be able easily to browse with such a system.

At this point I want to step back and review the types of need users have for library materials, consider how they are met now, and how they might be met in the electronic library. They can be listed as follows:

- Fast access to specific items that they are referred to by other works, by searches of databases or by personal information.
- Ability to identify, and have access to, information on a topic, which may be large or very limited.
- Ability to update themselves with current material on topics of interest to them: these may be central to their research, or on the margins.

- Ability to browse, for sources of ideas, to find material of relevance to their interests though not central to them, or to extend their range of interests.
- Scope for serendipity - accidental discovery of material that proves to be useful only when it is seen.

All these types of need should be met irrespective of where the material is.

Fast access can be achieved now if the items are in stock locally and available at the time of need. Some will be in stock in electronic form - on CD-ROM or digital tape or whatever succeeds them. If they are not in stock, journal articles can generally be obtained quite quickly - the same day if fax is used - from document supply centres or other libraries. If and when the journals are in electronic form, instant access should be possible. The same will not apply to books, except to excerpts from them, since they are unlikely to be held in electronic form and are not amenable to fax supply; but the increasing availability of union catalogues online and the ability to make requests online should shortly make it possible to get most books within a week at most. Where materials are held physically will be less and less important. It will not matter much whether they are held nationally or not; we in Europe should be planning universal access to all significant European library resources.

The ability to find material on a topic depends partly on indexing, partly on browsing, which I define as purposeful searching in conditions of some uncertainty. Studies have shown that an amazing amount of material is picked up by browsing, even in subjects such as physics. Good indexing ought in principle to make much browsing unnecessary, but in the humanities and social sciences in particular this is unlikely ever to happen. Years ago I was giving a series of lectures on nineteenth century attitudes to poverty in Britain. My most useful sources proved to be ordinary (in most cases not very good) novels of the period, in which characters revealed by what they said what most people must have thought at the time. I cannot imagine how the best indexing in the world could have helped me much.

The fact that browsing will never be replaced must not be an excuse for inaction on indexing. There are many factual needs in, for example, history that could be answered by better indexing. Inadequate indexing of monographs has been a theme of mine for many years- it has always seemed to me absurd that an average chemistry article of less than 10 pages should receive as many subject entries in *Chemical Abstracts* as a history book of 500 pages does in national bibliographies. I have outlined elsewhere[2] the sort of system that might be developed to provide better access through online databases giving keyword access to contents pages and controlled-language abstracts, which would be produced commercially, and to supplement this by access to actual back-of-the-book indexes which could be on digitally stored, or, possibly more economically, on coded microfilm.

Updating can, like retrospective searching, be carried out for specific topics or for general awareness. Specific needs can be largely met through SDI services, which have long been familiar for journal articles; for books the sort of database suggested above could form the basis of a similar service. General awareness can only be met once again by browsing, which means exposure to a wide range of current books and journal issues. In principle this could be achieved for journals by accessing electronic files, which would have to be done regularly (at least once a week). This is much slower and less efficient than scanning printed text. Whether or not many journals become electronic, if they are accessible only electronically I believe a great deal will be lost. One solution might be to make printouts for local use - printouts that would be discarded after a year or two. Another might be to have two versions of the journal: a temporary one, on very cheap paper, perhaps in newspaper format, which would allow one article to a page, produced in large quantities for sale to individuals as well as libraries, and intended for current awareness and browsing; and the permanent electronic version, which would be used for retrospective access[3].

The need for browsing has emerged in the previous two types of need. Serendipity is also a familiar experience to most users. It happens quite frequently in ordinary library use. The capacity of electronic systems to provide browsing and serendipity must await advances in expert systems which are able to identify the interests of individuals and display material of potential interest to them. Such systems could also help users with "question negotiation" - translation of their questions into terms that could be searched.

The future library will not be all-electronic. It will have to contain a great deal of printed material, not only material of the past which has not been put into electronic form but much current material, because that is the form which users will find most convenient and attractive to use. Insofar as it is electronic, the library can be expected to provide access to all kinds of bibliographic databases, including I hope far better indexes to books, and to a good deal of full-text material, mainly journals on CD-ROM or accessed remotely. Users of the electronic systems will not need to be present in the building; they can equally be in their offices or homes.

If such a system is to be workable, it will have to be self-explanatory and usable by the most inexperienced user. The library's own catalogues must be very easy to use, in contrast to many catalogues of the past; great advances have been made here. This is particularly vital if they are to be (as they must) accessible from any campus location. Library catalogues will, however, be less important than the various commercial bibliographic databases, since what the library happens to have will be less important than what it can provide access to. Unfortunately these vary greatly in their structure, indexing methods, and user-friendliness, and there is not a lot librarians can do about this other than to press for improvements. Even if they were all user-friendly, it is often difficult for users to know which database (or more often databases) to use. A lot more work needs to be carried out on expert systems that will make all databases appear to users as if they were one database, so that search terms are entered just once, and the system then searches whatever databases are appropriate, using the appropriate search terms. A good start has already been made on this at Carnegie Mellon University in Pittsburgh, and we can expect big improvements. Meanwhile, there is no reason why librarians should not work together to provide an automated guide to databases.

Use of the printed material in the library, which will be extensive, will still of course require most users to come into the building. Campus delivery systems are of course possible for items identified by remote use of the catalogue, but they will not serve the needs of scanning and browsing. The library must be designed for the utmost ease of use; most libraries I know are not. Their layout and guiding alone leave much to be desired. And why cannot users issue books to themselves rather than waiting in queues - which may be so long that some are tempted to temporary theft? It cannot be beyond the wit of librarians to code books and reader's cards in such a way as to prevent illegal borrowing.

Whether the materials used are printed or electronic, the aim should be ease of use and self-service - *openness*. Librarians have sometimes been described as gatekeepers, though many of them seem to have interpreted this role as locking rather than opening gates, and making sure that gates are only the first line of defence: when they are opened there are numerous other barriers to be overcome. Some librarians have a petty power complex; barriers that only they can unlock make them feel important (much bureaucracy exists to make unimportant people feel important). But gates are needed only if there is a fence or wall to keep people out and the only way in is through a gate. What we are now talking about is a library that needs no gate because there is no fence: a gateless library, a fenceless library, a library that is open to all, with no barriers inside or out. There may have to be controls, but these are not the same; and even controls can be user-friendly. "User education", which has so often been used to cover up for inadequate catalogues and guiding, should be seen as a last resort, a tacit admission of system failure.

In this future world of openness and self-service, which may not be far away, what role does the librarian have to play in service? Is there any role left for him or her to play? Certainly he or she must be responsible for organizing the system so that it is easy to use: what else?

The answer may lie in the provision of direct information services to researchers, of the kind that Herb White was advocating; to researchers I would add admininstrators. "Information services" can encompass a wide range of activities, from the provision of references, through the supply of documents, to the giving of "processed information" - information distilled from whatever sources are necessary into a form that is easily assimilated and requires little effort on the part of the user. This is the sort of service that information brokers give, and it is very demanding of both information and subject skills. It is also very expensive to give, and I can see no possible way in which it could be provided on any scale at all without payment by the user. It is a service that users could do for themselves, if they had time; but they may prefer to contract it out to the library, whether because they would rather not spend their time on it or because they believe the library could do a better job. It is their choice, and for this reason as well as economic necessity it is entirely justifiable to charge them the full cost.

The answer also depends partly on the direction that universities and libraries pursue. If, as seems most likely, universities move strongly and quickly in the direction of self-instruction, it is up to libraries to decide whether they want to be in the middle or on the fringe. If the latter, they will be losing their main chance to occupy a major role in the future. If the former, they have to make sure they can deliver what is required in the way of facilities and expertise. I said earlier that the future pattern of university instruction may be not teachers supported by learning resources but learning resources supported by teachers. Teachers will still give lectures, but many fewer; they will, as noted, produce much of the educational software, and make themselves available for discussion with students. I believe there is a massive case for a reallocation of university of resources from teaching to learning, on the grounds of both economy and desirability. We need to make this case again and again, the more strongly because it will not be a popular one. Librarians, if they are to become information resource managers, must be involved in the way the software is made available, and this may call for some involvement in the software design. They will have a more important role to play in the whole instructional system, and this will bring them much closer to teachers. At this point there may be another decision to make: whether or not to aid teachers directly in the instruction and support they give students. If the decision is positive, librarians will be involved in service to "users" - that is, consumers of educational services - of a much more direct kind than hitherto. The library itself may be self-service, but some at least of the library staff will cease to think of themselves, and cease to be thought of, as mere library staff; they will be active information and learning resource agents.

What do we need to do to realize my vision, or for that matter to survive at all in a healthy state? We have tended in the past to act as if the value of what they were doing were self-evident, and as if only blind or stupid administrators could deny us the resources to do it. Institutional power politics have been another world, about which we do not wish to know. But unless we learn political as well as information skills, and apply them, we shall be left badly behind in an increasingly cruel academic world.

## References

1. Feldman, Tony. *The emergence of the electronic book.* London: BNBRF with the Publishers Association, 1990. (BNB Research Fund Report 46).
2. Line, Maurice B. Bibliographic records for users: from disordered superabundance to cost-effective satisfaction. *Aslib Proceedings,* 42 (2), February 1990, 41-49.
3. Line, Maurice B. The publication and availability of scientific and technical papers: an analysis of requirements and the suitability of different means of meeting them. *Journal of Documentation,* 48 (2), June 1992, 201-219.

# User Service Improvements Using OCR-Technology

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## Abstract

**OCR-technology was a common ground in many administrative solutions long time ago as long as one could use one of the predefined character fonds available. The desire to read any fond is perhaps as old, but it lasted long before signs for complete fulfilment were possible. In general, application e.g. printing business OCR has for long been an established success. For more special purposes - in my case libraries - there has been much talking but very little that has reached a production status. A number of projects seem, however, to emerge from the first European call for proposals in the Libraries Program.**

**Speaking of OCR it is important to define a structure to avoid the confusion with all the variations and possibilities e.g. the borderline between OCR and image technology.**

**It should be observed that from being an interesting possibility OCR is now almost there. A number of applications are about to be set up. Some experiences have been gained. Therefore, it is time to identify objects in information that could benefit from OCR-technology and the existing problems. Once again the users' needs must be analyzed. One of the main barriers in modern information is that it is only modern. The emergence of new IT in recent years has only taken the modest steps backwards due to the price of information. By that we are almost making the past obsolete; what you don't find in a database does not exist.**

Therefore, it must be a challenge in the information business to convert as much of the information not stored in databases into this format - for the convenience of our users and the advancement of our profession.

First of all one could mention the bibliographic retrospective conversion area. From experiences so far it is possible to identify strategies and structures according to the present state of the art. Here it is also mandatory to take the discussion of information structure. The result of a pure scanning is no more than a pure string of characters. Around OCR-technology there has to be a number of assisting disciplines to ensure a proper result. Other library disciplines could benefit from OCR, think of document delivery. I'd like to focus on the following aspects.

- Identifying user needs compared with
- Identification and structuring of existing information
- Structures in present OCR-technology
- The borderline to image technology
- Library applications using OCR
- Post editing of OCR scanned bibliographic information

Apart from these general observations, which I have tried to follow for more than 10 years, the paper will discuss in detail the problems I have encountered in setting up a specific application: The conversion of the printed Danish National Union Catalog 1901-1980 into a database.

The aim of this program is to make a low cost simple conversion as resources are not available for a more comprehensive one. Simply, because the methods available just now will not allow sophisticated methods - at least not on a low budget.

The result of the program will be a database of 2 million records. The overall price including everything will be less than 0.15 ECU per record.

The paper will discuss the problems concerning technology and in doing quality and economic estimates in this field.

# User Service Improvement Using OCR-Technology

## Introduction

Some years ago I attended a conference arranged by the Danish PTT. It was in those days when cable TV was almost unknown and everybody was very excited about it. It was a very posh conference and they gave a splendid dinner. During the dinner a very distinguished gentleman from the PPT took the floor. I believed he was going to make a speech for the ladies. But he waved a magic wand and a curtain was taken away and one could see 14 TV-sets showing 14 different programs brought down to us at the conference by mysterious means - they had turned off the sound. It was a strange experience because on at least 6 of the 14 sets one could see programs one had seen before. The only one I can remember was Warsaw who that night gave 'Who is afraid of Virginia Woolf'. This is an example of a type of information we are not dealing with so much: Cyclic information. It comes around now and then and if you wait long enough you will be exposed to it again. Don't be sorry if you miss your favourite program in television it will probably be shown up another day on another channel.

## Types of Information

We can define 3 types of information:

- The eternal information. The one we really like.
- The cyclic information to which you should not pay too much attention as it will be there all the time. For instance, Shakespeare will never be out of print. You can always buy him, so don't bother too much about storing him.
- The short living information - the news of the last 24 hours. The newspaper of today will be used for wrapping fish tomorrow. That's all. Apart from libraries where you can't have the smell in the storage facilities of course.

How can we deal with information and classify it into these categories. What will be obsolete and what will become classics? Will a classic to one person be a classic to another person? A study some years ago on Danish fiction and poetry from the period of enlightenment to the mid-romantic period had the objective to analyze if we had forgotten a valuable Danish author. The main result was that those forgotten had deserved so. Now and then a forgotten work emerges again but must survivors do so in a process of forgetting things. If the process was redone the same result would come again.

## We Shall not Keep Everything

In libraries we keep things. In other areas they do other things. The British Broadcasting Corporation keeps 2% of what they broadcast. This could be an inspiration perhaps. In the Danish Radio they keep 4% because they can not afford to sort the material down to 2%. Keeping 4% is cheaper. People in broadcasting were horrified when the parliament some years ago passed an act to secure that the State of Denmark now preserves 100% of the output from all radio stations and television channels for eternity. There is no reason for it the professionals said. Can we learn something from it?

## Something is, However, Important to Keep

Something may be forgotten by natural reasons, but some relics will have to be kept for a very long time. Some areas are more vulnerable than others. Therefore, these areas have to keep things, especially in humanities where you can't leave the past behind you. I do predict that the demand for old material in libraries will raise in certain areas and not fade away. We will have a higher diversity than before. Ranging from information ending in fish wrapping to the things you will have to keep - and keep better than you did earlier. Even considering my remarks on throwing information away. The problem is that our past begins with the databases. Anything before the databases is from an archaic period you don't need to pay attention to. Many people do believe that what is not found in a database does not exist at all. On the other hand it is obvious that enormous amounts of information are not existing in databases at present. Therefore, such information is almost obsolete and will be forgotten in few years however useful it might be.

## Retrospective Conversion

There are good reasons to do retrospective conversion in many areas. It has been done and we are doing it constantly, where we can afford it. There are at least two dimensions: You can start with bibliographic references and you can continue with full-text. The first example I can recall was an American subject bibliography which was republished on microfiche in the late sixties. Half a year later all the titles indexed in the bibliography were republished on microfiche, too. This pattern could have been expected to be more popular and it will be when new methodologies are available at the right price. You start with the bibliography and end with a full-text version of all books indexed.

You have had manual conversions for years. They are very costly and know that you will never be able to do the job the way you would like to do it. The known methods can not be used for the future bulk conversions. Of course we know that there are agencies who can do this for a price you can pay or perhaps not pay. These agencies are very useful in their work and also as reference tools for those who are involved in making new methods. New methods can always be tested against a commercial price of today. So it is a matter of making methods that can beat the present commercial prices.

## History

This area has its history as everything else. I may recall parts of it: The oldest example of more advanced retrospective conversion I remember was with the Library of Congress back in the sixties called RECON. Later this acronym has been recycled into another usage. It was a marvelous plan on doing optical scanning of bibliographic material. It failed mainly because they could not get the reader to work or the company could not produce the reader. Reports were published so you will have no problems in checking the project. The other major example I can give you was the British Library GK conversion of the early eighties which was a major failure in using modern scanning techniques, so they ended using semi-modern technology and you have had the product out on CD-ROM for years. But the first essay in using advanced technology - which was already outdated in the period, it was computer input microfilm (when I tried to retrieve information on the technology the acronym CIM was already allocated to something else) - failed. It was a very gallant try by the British Library, however.

## Images

Concentrating on scanning you can do so for many purposes. You can scan for images. It is done very much in publishing. The main problem is the requirement for storage capacity. It is a pity that this method has not been explored far more in library circles. It has been available on a commercial basis for 6-7 years and I don't recall one site in Europe where it is used in library applications beyond the experimental stage. It is not that the starting price for equipment will be in the area of 150.000 ECU. This should not scare the libraries off. Handling is very easy - like using a photocopier - and you can transmit scanned documents, image documents, by fax to customers without using paper in any stage between the source database and the receiving fax. So this method is also a very efficient delivery system, but there is no usage in libraries. Somebody should be encouraged to play around with it to get experience in library applications. I might add that instead of scanning for digital images you could perhaps try to use the new HDTV technology. It could turn out to be a much cheaper solution for scanning and storing images if the resolution is good enough because such applications would be in the tail of mass market products just like the CD-ROM is only available in the information world because it is in the tail of the CD-AUDIO from the mass market. If libraries really shall go into the image technology somebody has to test the HDTV method. It is not digital, but analog-digital. We don't know whether the resolution of the HDTV image is sufficient for our purposes, so that would constitute the first step into this technology. We know that images on normal television standards are so appallingly bad that you can't use that technique for textual material.

## Text

But it is not enough to scan for images. You will need to know what text you actually have in the image. You can do it and most in the audience have certainly experiences in scanning. It is not a way-off technology. You can start very easy with a flat bed scanner and some PC software and you will probably get some lousy results. It is, however, a bit complicated to find out how to scan. If you take an ordinary page from a newspaper your scanning might detect the individual characters on the pages, also the different columns. To put these elements back into logical and natural sequences of articles with headings and sub-headings and text is a much bigger challenge, but a smaller one compared with the task of making a structure in a string of characters to turn it into a meaningful tagged bibliographic record. There are a few examples of people who have achieved parts of this goal.

I have done some experiments myself during a rainy Easter holiday where I started to program a system for analysis of bibliographic information. I found that it is not that complicated using the right approaches. Without going in programming details it is obvious that it can be done and more should be encouraged to make systems.

It is understandable that the European Commission in its Libraries Program has made scanning and OCR for record building one of the preferred themes in the Action Line 1. At the first call for proposals in the Libraries Program 2 proposals containing OCR elements were actually selected. I was relatively close to one of the proposals because it was made by a colleague in the institution were I was earlier. It is a Danish-Italian-Greek-project where the aim is the scanning and OCR conversion of catalog cards - resulting in a product in a MARC format. They will succeed because the experiments have now come to a level where serious results can be expected.

## Feasibility

The problem is at what price can it be done? I made some calculations 4 years ago to show the situation. This indicated that OCR based conversion was possible and that the price would be just below (5-10%) the price of the commercial vendors in retrospective conversion. But that was not enough to take the risks of building up a large volume capacity for conversion. The conclusion 4 years ago was that it could be done from a technical point of view but that the margin in economic terms at that time was too little to make a sound investment.

## Experience from Starting a Project

Now my approach to the topic has moved from the general issues where it is my belief that we shall concentrate - especially in humanities - on establishing methods to make our past survive into the databases for those areas of information which have to be kept. Perhaps throwing some smelling fishes of information away. I will now turn to some details in actually doing practical conversion.

After many years of theoretical interest I have had the opportunity to be involved in the start of a project set up in 1991 by the Danish National Library Authority. I am not involved anymore, but I am convinced that the project will succeed.*

## The National Union Catalog Conversion

The project concerns the scanning and conversion of the Danish National Union Catalog published in printed form in annual volumes from 1901 to 1980. It was succeeded by the database 'ALBA'. Our past starts at the present in 1980. Over the years it has appeared with different fonts, different editorial principles; there has also been various notations for location code. There are many variations to take into account. The purpose is to do a discount database for the purpose of pure location and nothing more. The annual volumes contain together 2.2 million titles.

One of the prerequisites is that the Danish Research Library Database 'ALBA' has the ability to search by every work in free text searching. On this background a simple solution can work fine.

## Kurzweil

We acquired a Xerox Kurzweil K5200. This device is probably better than any of the previous Kurzweil models and it is ranking as one of the best on the market - at least last year. In an unpublished EEC study on optical media it is also ranked as one of the best.

The K5200 scanner is a box where you can put paper in on the backside and it comes out in front. It is attached to a PC. The remarkable thing is that between the scanner and the PC there is another box. It contains a RISK processor that does the trick. The machine has a price of 50.000 ECU incl. software, so it is not cheap compared with other devices on the market. On the other hand it is far better than most of the things you see. In the mentioned study there is a statement that you should expect an accuracy of at least 95%. If you are satisfied by that you are not in business at all.

A randomly chosen page from the national union catalog contains 6,000 characters. Imagine the number of errors in one page at a level of 95%. Normally the K5200 is better being close to 99,5%. Most of the errors are easily identified.

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* The first tiny part was made available in the Danish database 'ALBA' on December 29th 1992.

The figure is the direct printout from the scanning. Some errors can be observed such as making too many spaces at the top of the column. Dirt and spots in the printing can be turned into strange characters or errors. What we normally believe as a good printing observed with the naked eye can be identified by the scanner as a printers mistake. Another typical error can be seen: mistaking a quotation mark for two commas. Some of the mistakes can be mended fairly easy in the post editing some by simple algorithms, but you could count 2 commas in sequence as a legal possibility, so a certain manual effort is necessary.

## Problems

One of the problems we have is very simple and stupid, but that type of problem is often what you remember after a project. I remember one I did many years ago. The main lesson was that you can't put a half inch magnetic tape into a Danish letter box. This lesson is stupid. Who would use computer tapes for transmission of data these days. But it was crucial in those days. In the present situation the stupid problem that the scanner is using two principles for recognition simultaneously. It detects characters and tries to combine these to words. These 'may be' words are then compared with a built in dictionary. The scanner has dictionaries on eight languages and they are like spelling checkers in a word processor. All the easy words are there, but the complicated words are always absent. In a bibliographic context there are not easy words. First of all it is multi-lingual and all the personal names, the geographical names and the posh title words. They are not in the scanner and this results in a lower accuracy.

We tried to negotiate with Xerox to have a dictionary of the 50,000 most frequent words in the ALBA database. They had the options that we would pay everything then holding the rights or it could be a joint venture, but they did not wish to co-operate thereby leaving us with a lower accuracy rate than the optimal. Most libraries working in this area will in future have the need for such a dictionary. Let me give an example of an easy improvements: Often you can see a word like 'Stockholm' and that could have been avoided.

## Discount Solution

We started with a total discount approach saying: Why don't we scan a page and make the whole page a record - unstructured? The search system can find any word. It was tempting and a mock up system showed promising results. For several reasons it was too simple. First of all a page of 6,000 characters would need at least 4 screens to be displayed. That could make a confusion. The text has word separation at the end of lines and then you could not retrieve a separated word. Some entries started on one page to end on another. And something very important, the location codes should be correct and updated to the newest version, so they at least should be identified in the scanned text. There was a conclusion that a very simple format shall be used: an author statement, a title statement (and the rest) and the location code. Made simple and compatible with the MARC format to go into a bigger database. (Later, however, it has been decided to build even more structure into the data by a more advanced post editing software.)

If you don't like the discount approach you should remember that the cheapest price for commercial conversion is a little more than 1 ECU a record. If you have special wishes the price may go up to 3-3.5 ECU. This is the price tag to beat. The calculations in this project shows a price of 0.15 ECU a record. Multiply that with 2.2 million records and the overall price is still affordable. It will not be a nice quality but it will serve its purpose. But fulfilling a specified purpose is sometimes good quality even if it may look lousy to you.

Some of the projects coming out of the European Libraries Program will probably have a much better quality, but will also have a higher price per record. But they will still have the margin to beat the commercial price. The commercial vendors will apply these methods to lower the price and that can only be good for retrospective conversion.

# Understanding the Needs of Users : The Timeliness Factor

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## Abstract

**Academic libraries have historically based their acquisitions planning on a 'just-in-case' model. A combination of information technologies and management strategies will allow libraries to adopt a 'just-in-time' philosophy. Service to faculty and students can be expedited, and more effective use can be made of constrained resource budgets.**

**Several scenarios for such change are described, and the implications for implementation are identified. The requirements for fundamental change on the part of many librarians and scholars is also noted.**

# Understanding the Needs of Users : The Timeliness Factor

In January, 1992, Kendon Stubbs, who edits the annual compilation of statistics for the Association of Research Libraries (ARL) suggested that "ARL libraries are moving from the 'just-in-case' model of on-site resources to the 'just-in-time' model of resource sharing."[1] The basis for this judgement can be illustrated with a review of data from ARL libraries for the past five years, as illustrated with a representative sample of statistics.

**Table 1**

Serials : median percent of acquisitions budget

| 1985/86 | 1986/87 | 1987/88 | 1988/89 | 1989/90 | 1990/91 |
|---|---|---|---|---|---|
| 55.2% | 57.4% | 57.8% | 58.9% | 58.8% | 61.9% |

**Table 2**

Serials : median percent of total library budget

| 1985/86 | 1986/87 | 1987/88 | 1988/89 | 1989/90 | 1990/91 |
|---|---|---|---|---|---|
| 17.8% | 19.6% | 20.3% | 20.3% | 20.4% | 21% |

Rising prices have caused an increasing proportion of library budgets to be allocated to serials, even though fewer subscriptions can be purchased with that increased amount. No longer able to encompass purchase of sufficient subscriptions or monographs to satisfy the demands of potential use, the libraries have turned to resource sharing solutions in record numbers.

**Table 3**

ILL : Lend and Borrow

| | 1985/86 | 1986/87 | 1987/88 | 1988/89 | 1989/90 | 1990/91 | % increase |
|---|---|---|---|---|---|---|---|
| Lend | 16,151 | 16,608 | 18,198 | 19,694 | 20,837 | 23,588 | 46 |
| Borrow | 7,048 | 7,361 | 8,078 | 8,548 | 9,595 | 10,397 | 47,5 |

While these changes were taking place in a climate of financial restraint, one might have anticipated a matching decrease in established library positions. This has not been the case; from 1985/86 to 1989/90 there were miniscule - less than 1 percent - staff increases; in 1990/91 the trend reversed with a decrease of 1.5 percent.[2]

Canadian ARL members, in part because of a de-valued currency, have as a group experienced more drastic changes, with one library forced to reduce the staff budget by 11 percent in a single year (1990) and serial subscription cancellations a common occurrence for them all. Most Canadian ARL libraries also experience serious space shortages; for example, the space deficiency for five of the seven Ontario ARL libraries ranges from 15 to 47 percent.[3]

If academic research libraries are, either by design or force of circumstances, moving from a 'just-in-case' model for library collections and depending on resource sharing to deliver a desired item 'just-in-time', has the user community accepted this changed direction with complacency? Not at all; it is with the greatest reluctance that library users have become partners in an enterprise of reduced local resources. As a result, most libraries have moved to make resource sharing more acceptable, adding Table of Contents (TOC) databases to local online catalogues and using FAX and network technology to speed the "timeliness" of library services. Unfortunately, many library users, familiar with the speed and the directness of information exchange on the world's academic networks (for example, Bitnet, EARN, the Internet, and the NREN), are now demanding that libraries move from traditional library models, ever more quickly.

A review of several suggestions which have been made, and of systems proposed or implemented, illuminate the complexity and the challenge which librarians face in an academic community that will accept 'just-in-time' services only if they are linked to an "electronic library". A moderate definition of an electronic library would be: a physical facility, with books, users, and library staff, but with organization, access, retrieval , and to an increasing extent, information resources in digitized format linked to local, national and international networks.

## 1. The Bulletin Board

A recent exchange of letters in Physics Today illustrates one suggestion for change from a user's perspective. David Mermin, a Cornell professor who is a frequent contributor to American Physical Society journals, suggested a solution to the problems of scholarly journals, and access to them, which he identifies as follows:

- Journals are a waste of costly space;
- The high cost of publications is resulting in academic libraries being forced to cancel increasing numbers of journal subscriptions. As Prof. Mermin complains, he spends his time on the Cornell Library Committee deciding which journals to cut;
- The costly and time consuming refereeing process.[4]

Mermin is quite forthright in his solution to these problems: abolish (print) journals and the refereeing process, and replace them with an E-Mail Bulletin board. "Libraries, for a fraction of the enormous sums they now waste on journals, (can) set themselves up with terminals for perusing the Bulletin Board and with printers for producing hard copy at no more expense than is currently spent on copying machines."[5]

Respondents in a subsequent issue of Physics Today took exception to his proposed Bulletin Board solution and identified a new set of problems:

- The costly waste of user (scholar) time if peer reviews were to be abandoned;
- The cost/authority/responsibility of providing an archiving system for the Bulletin Board;
- The need for graphics for most scientific publishing and the lack of standards for graphics software;
- The difficulty in assessing and distributing costs for subscriptions to electronic journals (which might be a variant to the Bulletin Board scheme);

- The elimination of the serendipity aspect of the user approach to information; browsing in a Bulletin Board would be very topic limited and would not allow an interdisciplinary approach.[6]

In other words, the timeliness issue has been addressed, but not all users agree that their needs have been understood in the response. It should also be recognized that solutions such as a Bulletin Board would disenfranchise many people with legitimate needs: third world countries do not have computer networks with uninterrupted power supplies.

## 2. Just-in-Case and Just-in-Time

The second solution can be called 'just-in-case' as well as 'just-in-time' because it is based on a traditional collection in addition to electronic library technology to deliver information, in this instance full-text articles, to users in remote locations within an acceptable time frame. This system is the British Library Document Supply Centre (BLDC) described in detail by Andrew Braid at the 14th Essen Symposium in 1991. The BLDC system is based on an on-site collection of 50,000 serial subscriptions and monograph acquisitions of 40,000 titles per annum. Using FAX and the United Kingdom academic network (JANET) and experimenting with electronic storage of documents through the ADONIS system and CD-ROM juke boxes, Braid suggested that he hoped to be able to deliver documents directly to users, eliminating the need for libraries as supply or request centres.[7] However, since it must be assumed that end users had some mechanism - periodical indexes, current contents, a citation from another paper - to identify a wanted article, it appears that some role for libraries, albeit a modest one, is to be retained.

## 3. Bulletin Board - with Anchor

A different model was described at the same Symposium by Bonnie Postlethwaite, who extended a concept for a scholarly communications system based on the NREN. This model, somewhat similar to Professor Mermin's Bulletin Board, puts the onus on the scholar to place his article on the network for, 1) comment, and 2) an electronic peer review system which would be established. Royalties would be paid whenever the commented on, revised, or reviewed article was printed from the system. Use would be tracked for the tenure process, and everything would be funded by grants and fees paid by the user institutions.[8]

Postlethwaite anchored this Bulletin Board by suggesting that librarians at the author's institution would be responsible for "cataloguing and indexing" these electronic articles, and would also take a leadership role in the development of standard thesauri for the necessary global and controlled vocabulary, so that retrieval anywhere on the network could be possible.[9] This vision of an enhanced library role in the electronic delivery of information to users is in contrast to that of the BLDC, but there are three concerns which are difficult to ignore:

- If others have had experience similar to that at the University of Guelph, where librarians have found it difficult to persuade faculty members to inform them of a newly published book, how are librarians going to track down faculty members who have submitted a tentative research report for peer review on an electronic network?
- Are traditional cataloguing and/or indexing methods and use of the Library of Congress controlled vocabulary thesauri (LCSH) really the answer to the organization and access provision for current journal literature in an electronic library environment? If I may quote from Jerry Campbell of Duke University:

  > "It is astounding that we continue to use and defend a system that has failed us for decades: our cataloguing systems have long been inadequate."[10]
- Moving responsibility for networked information systems from central services - the library - to the individual user - the faculty - will reduce the time available for research and teaching.

## 4. A Commercial Model

A new approach to the 'just-in-case and just-in-time' model appeared with the 1991 announcement by the Faxon Company, a provider of 'just-in-case' subscription services to libraries for more than a century, of the inauguration of Faxon Research Services, a 'just-in-time' service with two components: Faxon Finder, A TOC service; and Faxon Xpress, a document delivery service for journal articles. Faxon will initially act as a broker between publishers and libraries, using OCLC as one vehicle for mounting their TOC database. The predictions for the FAXON Research Services, which will include payment of copyright fees, are for a tremendous growth in 'just-in-time' services, inevitably emphasizing direct service to users.[11]

This system appears to be midway between Prof. Mermin's Bulletin Board and the traditional 'just-in-case' library collection. Conceivably, libraries could continue to keep subscriptions to those print journals most heavily used, while providing access to the Faxon TOC database either through OCLC or the local online catalogue network. It is also possible that some of the costs could or would be transferred to the user: copyright, FAX, and delivery. How much an individual user will pay for timeliness is a question not yet addressed.

## 5. The Invisible Library

Linked to the entry of a commercial subscription service into the electronic library environment is a disturbing report from the American Physical Society Task Force on Electronic Information Systems. Echoing and legitimizing the proposed Bulletin Board, this report identifies a need for a national physics database which would evolve into a total physics information system. The manager of such a system could be either not-for-profit institutions, like the Society itself, or a group of learned societies; a government agency such as a national library of science; a commercial agency; or a combination of all three.[12]

The database which would be created, and which would be available at the scholar's/user's workstation, is compared, most unfavourably, with the present physics information available from academic libraries. "The entire Physics database will be searchable at one time. This contrasts with the present non-electronic libraries, which are highly fragmented and are searchable only within small domains of the literature (individual books, individual journals, only bibliographic information, only citations, etc.) and/or time (a few years, just one year, just a portion of a year.)"[13]

## 6. A Canadian Experiment

Our next model is Canadian and it responds to several problems in the present academic/research library environment in Canada, identified above:

- serious staff reductions;
- acute space shortages;
- serial cancellations;

- increased dependence on resource sharing, with a stricter copyright law than that enjoyed in the U.S., which means higher costs to both libraries and users.

What is proposed as a pilot project in a populous area of Southwestern Ontario (four universities in very close proximity) is considered an interim step before the reality of the electronic library, and it consists of four elements:

- Joint or cooperative off-site storage.

  This facility would be owned and operated by its members, would be centrally located, and would be served by an existing inter-university transit service. Member libraries would consolidate research and less used materials, both journals and monographs, and one copy only of each title or volume would be assigned to the storage library. The records for all items in the storage facility would appear in the catalogue database of each member library without attributed ownership, but with location indicated: storage library. Thus students and faculty would have access to an enlarged and enriched collection and database from the member libraries or from remote user workstations (home or campus). At the same time, the participating libraries would regain considerable valuable space.

- Users would request items from the storage facility at their home institution by placing a HOLD through the local online catalogue/circulation system. This action would trigger a retrieval request at the storage facility where staff would locate and send (via existing transit) a desired monograph to the requesting library; or scan and FAX a journal article. A circulation module, enhanced with article identification, would record the transaction, borrower, and due date (as appropriate). Conceptually, any service charges required for the scanned article service would be incorporated in the FAX transmittal sheet.

  A TOC database for those journal subscriptions held in the storage library would be added to the online catalogue system of member libraries. Requests for TOC articles would be similar to those which are citation initiated.

- Payment for this model would be generated by the savings of the cancelled subscriptions at each library, and fees for the article services would be less than presently obtain.

- Limited workspace at the joint facility would accommodate researchers who wish to consult the original journal sequences, so that the serendipity factor would be retained.

An extension of this model would be joint subscriptions to electronic journals, maintaining the basic access principles but requiring a different format for assessing user fees. Use of ARIEL software which would reduce both costs and time is being investigated in a separate Ontario study.

## 7. The Virtual Library

The final model, the virtual library, is defined as the transparent connection of electronic communications and computer networks, which makes it possible to satisfy the information needs of a single user wherever she/he resides, independent of the location of the services/resources required. Early manifestations of the virtual library exist: one is that developed by the Colorado Alliance of Research Libraries (USA) which has mounted journal TOC and index databases on its bibliographic system and makes them available, through Ariel software and Internet, to its own members in Colorado, or markets the system to other consortia.[14] Another is the exciting experiment (described at this symposium by Mel Collier) at the newly established De Montfort University (U.K.) where library services will be provided electronically through document image processing technology, and in cooperation with electronic publishers.

Impetus for the creation of the virtual library in North America has come from the Coalition for Networked Information and two educational consortia: CAUSE and EDUCOM. The goal of the Coalition is to "put a virtual library into scholars' hands, giving them access to all information available electronically."[15]

While many of the technological requirements of the virtual library are in place, many administrative, legal and financial issues need to be addressed: common standards and protocols; copyright and royalty arrangements; peer review, tenure, and other elements of the scholarly communication process; and administrative responsibility or authority. Competition among potential virtual library providers, or partial providers, looms large on the horizon. The question for librarians relates to the identification of the driving force behind the decisions which will form the virtual library, and the role for libraries which will remain.

## Conclusion

It should be obvious, from this quick overview of the timeliness factor in responding to users information needs, that the 'just-in-case' position - that is, the maintenance of large and complete library collections, is, in the long term, an endangered species. This is also true of the assumption, so prevalent in present library comparisons and rankings, that equates quality with quantity. But within the 'just-in-time' position there are many models or paradigms that can or could be considered. It is probable that aspects of several of these different models will be implemented, at least initially or temporarily, on an individual campus or within regional consortia which have not already done so. However, the inevitability of the electronic library being replaced by the virtual library, or something very much like it, must be recognized. The timeliness factor is not in itself the issue which librarians should be addressing, even at a period when the reality of the electronic library is not entirely evident. What is at stake is the future of academic libraries as major players in the scholarly communication network.

There is a subtle difference between the terms electronic library and virtual library. The electronic library can still maintain a physical and human presence: there will still be books and journals, maps and documents; electronically accessible, it is true, but also in print format that can be held in one's hands and placed in one's carrel. As well there will be equipment stations, for microcomputers, CD-ROM drives, databases, and online catalogues, where a variety of electronic services will speed access to the printed copy. Admittedly, these databases and services will also be accessible from remote, non-library locations, but the electronic library implies something else: librarians will be present to facilitate access, to mediate retrieval, to instruct in protocol as well as bibliographic processes. These characteristics may not obtain in the virtual library, since its existence is perceived as transparent: transparent physical facilities, like transparent librarians, are not tangible concepts.

But even with this hopeful vision of the electronic library, concerns remain. As Michael Malinconico pointed out a few months ago, "the scenarios we have constructed of the emerging electronic libraries assume the continuity of present institutional and organizational structures." It is assumed "that the institutions currently identified as libraries will increasingly acquire modern technologies,". . . "employ a variety of electronic services to satisfy the information needs of their users", . . . and such "technologies and services could continue to be under the control and management of librarians." Malinconico feels that "regrettably, we have failed to consider another equally plausible scenario," in which "information resources are drawn into the orbits of influence of those who maintain the technological infrastructures, including campus computer and commercial information centers. Librarians who cling to the old paradigms of librarianship may find themselves curators of infrequently used, increasingly irrelevant information museums."[16]

Herbert White echoes this theme, and suggests that librarians are akin to the vanquished Gideonites, who ended up as "hewers of wood and drawers of water," primarily because, in the information technology environment of coalitions, we "lost sight of the ... primacy of our role and mission and allowed ourselves to become bit players and spear carriers in the scripts of others."[17]

A 1991 British Library assessment of academic libraries in that country concluded that, with the increasing financial pressure on libraries, university departments will finance their own electronic access to databases, and "libraries may gradually become marginalized and consequently downgraded to 'swotting sheds'".[18]

The Canadian scene is no brighter! A study at the University of Manitoba which looked at the perception that faculty and academic administrators held of academic librarians, concluded that "librarians are not commonly viewed as contributing greatly to the overall educational process."[19]

A year ago at the Essen Symposium Richard Dougherty entitled his paper "nudging a dinosaur in order to avoid library extinction".[20] During this past year there has been more evidence of the very real possibility of such extinction:

- New BLDC services or the De Montfort experiment;
- Professor Mermim's Bulletin Board;
- Faxon Services;
- The American Physical Society's database,

are only a few examples. There also continues to be evidence of dinosaur nudging, as many librarians remain determined to use information technologies to perform traditional library tasks, unaware of the threat from new information professionals prepared to ignore the library as they provide innovative information services directly to the user community.

The definition of the virtual library is neither complete or clear, but the outlines are beginning to emerge, as are the pathways to it. Many obstacles obscure those paths, but mileposts along the way can be identified:

- Dramatic change;
- Difficult choices;
- Equitable sacrifices;

These are the challenges which librarians face and must conquer if they are to be part of the future, serving the information society in the virtual library.

Dinosaurs are not included.

## References

1. ARL Statistics, 1990-91, Washington, D.C. 1991.
2. Views. *Library journal*, March 1, 1992. p.25
3. Building blocks; the final report of the Task Force to review COU space standards. Toronto, COU, 1988. p.34
4. Mermin, David N. Publishing in computopia: *Physics today*, May, 1991: p.9
5. Mermin. op.cit. p.11
6. The rocky road to computoria; letters: *Physics today*, January, 1992. pp.13-15; 94-99.
7. Braid, Andrew J. Barriers to the introduction of new technology. *Libraries and electronic publishing: promises and challenges for the 90's; 14th International Essen Symposium*. 14-17 October, 1991. Essen University Library, Essen, 1992. pp.1-16.
8. Rogers, Sharon and Charles S. Hurt. How scholarly communication should work in the 21st century. *The Chronicle of higher education*, October 18, 1989. p.A56
9. Postlethwaite, Bonnie. The global library; the impact of highspeed networks on libraries. *Libraries and electronic publishing: promises and challenges for the 90's;* 14th International Essen Symposium, 14-17 October, 1991. Essen University Library, Essen, 1992. pp.55-72.

10. Campbell, Jerry D. Changing the 'sixty-forty split" revisited'. *Library administration and management*, Summer, 1992. p.129

11. Heath, Fred M. An interview with Thomas J. Michatak. *Library administration and management*, Spring, 1992. p.64.

12. American Physical Society. Reports: 36, 1991. pp.1119-51.

13. Ibid. p.1133

14. Machovec, George S. Locally loaded databases in the Arizona State University online catalog using the CARL system. *Information technology and libraries*, 8:2, June, 1989. pp.161-171.

15. Turner, Judith Axler. Coalition plans to organize information on computer networks. *The chronicle of higher education*, March 21, 1990. p.A20.

16. Malinconico, S. Michael Information's brave new world. *Library journal*, May 1, 1992. pp.36-40.

17. White, Herbert S. Hewers of wood and drawers of water. *Library journal*, October 15, 1991 : 52-53.

18. Martin, John et al., eds. Information UK 2000. New York, Bowker/ Saur, 1990. p.1

19. Demay, Gaby, et al. Faculty perceptions of librarians at the University of Manitoba. *College and research libraries*, January, 1989. pp.27-34.

20. Dougherty, Richard D. Nudging a dinosaur in order to avoid library extinction. *Libraries and electronic publishing: promises and challenges for the 90's; 14th International Essen Symposium*. 14-17 October, 1991. Essen University Library, Essen, 1992. pp.17-30.

# Opportunity 2000 : Understanding and Serving Users in an Electronic Library

## Conference Summary

**David J. Price**

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# Conference Summary

It is a tremendous honour for me to have been invited to summarize this conference. It has been an extremely exciting and stimulating conference. The papers have been excellent, the discussions informative and, to top it all, as Maurice Line has told us we should, and indeed demonstrated how, we have had fun.

I remember Philip Bryant prefacing his summary of the 13th Essen Symposium by asking a strange question. He invited all those who had chosen librarianship as their first profession with enthusiasm to raise their hands (BRYANT 1991: 226). I was one of the vast, silent majority and kept my hands firmly planted between my knees. This was not just a natural response to the fear that we were about to become victims of that peculiarly sadistic technique of modern theatre called audience participation, something akin to management participation. In truth, I have been a librarian for only nine years - what will seem to the most of this illustrious and, let us say it, influential audience a very short time indeed. Why should Ahmed have done me the great honour of asking me to summarize this important conference, and how can I possibly be qualified to do so? I can only surmise that he had something we librarians often overlook when serving our users - inside information - and knew that I had been a social anthropologist. In the words of Joachim Weiss, Ahmed has a long nose and long eyes!

Now the musings of anthropologists have not, by and large, impacted the world greatly, and, truly, it is difficult to see how concepts of kinship theory or the raw and the cooked can be brought to bear on librarianship. But let me tell you that when any anthropologist hears the title of this conference, "Opportunity 2000", his ears will prick up in an automatic professional response, for these words he can at once and unequivocally classify with the anthropological term "millennial".

How far dare I push this analogy with the cargo cults of Melanesia and the millennial movements that have occurred throughout history? It is tempting for we have heard of "vision statements", "mission statements", "enshrining our users" and, in Ellen Hoffmann's words, "innovations are acts of faith". Is it a vision of a better world to come that has led us to make a pilgrimage to Essen to pay homage to our high priests, Ahmed and Herbert White? Is it our belief in the electronic library that separates us from the colleagues we have left at home? And how much do we have to evangelize when we appeal to our gods to deliver the electronic goods, that is to say, when we petition our paymasters for the funding to make it all happen?

At Oxford we are perhaps less millennial in our objectives: to quote from a recent report, whose central plea is coincidentally “to bring the Bodleian Library into the twentieth century before the beginning of the twenty-first“. Paraphrasing again, I am afraid that “achievement may not match aspirations“.

But speaking as a lonely systems librarian at Oxford who spends much of his time preaching the word of the Networks in a world of electronic pagans, here I feel I am with the converted and it is so nice to be among friends.

I came to the library world for two reasons. Firstly, for financial security. I did not expect to become rich but, I argued, the collections would never stop growing so people would be needed to care for them. Hmm. Secondly, I love books. Not being as bold as Philip Bryant, I cannot quite bring myself to say hands up those of you who in your professional capacities ever touch a book !

Naturally, before I came to Essen, I did a search on “White, Herbert S.“ so I could do a little reading. Now I understand information overload. I am relieved to be able to tell you that through our OPAC I found one of Herbert's books and, even better, it was in our staff library. But when I went to collect it, I was not prepared for the nudges and giggles from my fellow librarians who had been reading it all morning. The answer was on the spine: *Librarians and the Awakening from Innocence*. I just hope it will do for libraries what Malinowski's *The Sexual Life of Savages* did for anthropology which proved to be a literary equivalent of an “athletics scandal“.

It is not easy for me to summarize in a short time, the wealth of ideas and experiences we have heard and all I can offer is a snapshot of the impressions and themes I have managed to absorb so far. In any case Maurice Line has covered much with his own vision of the future though it is not completely in accord with those of other participants. But there are two moments I shall especially treasure: firstly, when the tall dark handsome non-European on the left, with a four letter nickname beginning with D turned out to be Doris; secondly, when Ahmed, receiving his *Festschrift*, was virtually, though not really, at a loss for words.

The conference began in splendid style with a rousing delivery from Herbert White whom we honour at this conference. In this rich and lively paper, containing much advice deriving from a long and distinguished career, he proposed novel and courageous techniques to advance libraries, and on the way turning many ideas on their heads. He talked of "market destabilization", "radicalizing users","exception reporting" and that "it is not that we are so expensive but that we are so cheap". Now just what did he mean by cheap?

Like many subsequent speakers, he stressed access versus ownership but considered that we tend to overestimate short term changes and underestimate the long. Nevertheless, change is apparent and he expressed the fear, echoed by others, of librarians being bypassed in the information process.

We heard of some approaches to this change. Ellen Hoffmann presented an illuminating analysis in terms of adoption and implementation phases, policy-maker versus practitioner, illustrated by the AJAP.

In telling us how Aston has accommodated the impact of the "networked", rather than the "electronic library", putting people first, staff and readers, Sheila Corrall described the employment of participant management and TQM.

Barbara von Wahlde examined the implications of globalization of library resources. Maurice Line considered her strategy of wrapping recalcitrant organizational structures in the new as insufficiently radical.

Richard Dougherty, with political realism, set libraries in a multi-institutional environment in order to determine their needs, and he described experiments in collaborative thinking which threw up awesome ideas such as "risk-taking leaders" and "crop rotation". But of collaboration, a recurrent theme of the conference, he sees no models in the US.

Maureen Pastine, too, urged the need for collaboration, the development of a CIS and the need to educate and inform Faculty. But I could not figure out her joke about Dumb Blondes?

Margaret Beckman referred to a lack of collaboration between Faculty and Library with respect to their publications and she worries that this will worsen as they publish more electronically. As regards the societal preferences for search intermediaries referred to by Maureen, Sigrid Reinitzer's data spotlights the professors. I was hoping a certain professor would be here to comment.

Gunhild Bäck talked of automation necessitating cross departmental co-operation. Uppsala University Library, founded in 1620, contrasts starkly with that of her fellow speaker at that session, Mel Collier who really, virtually has a real Virtual Library. Here we can expect to see the paradigm shift from teaching to learning mentioned by Maurice Line. God speed Mel! We shall all be watching you with envy and trepidation.

Another recurrent theme was dinosaurs who were finally so beautifully brought under control by Margaret Beckman. They were nudged, electrified and Stuart Ede even had them banged up in Porsches. Goodness knows what the Chief Executive would say. So the British Library is a Virtual Library. But for how long? It was a pity Stuart was denied for the very best of reasons the possibility of taking questions after his informative presentation as we all, to a greater or lesser extent, have a vested interest in the future of the British Library.

Andrew Torok's talk was extremely useful and informative. It was also well-informed - optimistically speaking - warning us of the dangers of "technophoria" and that convincing end users they should do searches themselves may lead to the extinction of librarians. We too shall go the way of the dinosaurs, though how many of us have Porsches?

Reinhard Nedela and Christian Heinisch both gave us lucid accounts of CD-ROM networking environments. Though they spoke on different aspects, both were anxious that we appreciate the heterogeneous nature of modern networks and that we should press vendors for concurrent use licences. Christian reminded us of the effort required to maintain a CD network and never to believe that a network is finished.

There was much discussion of retrieval mechanisms. Eva Bertha proposed a system for linking bibliographic units into literary units, and I am sure that this will prove to have a practical application of great value. Ronald Schmidt, whom I suspect prefers steam catalogues, discussed the use of a "meta-language" to provide a seamless integration across disparate sources, including non-bibliographic material.

Irene Sever was concerned that we do not have the tools to catalogue meaningfully audio-visual material and about the seriousness of neglecting it. I do not know if she was horrified or relieved to hear the retention policies of the BBC and Danish radio as related to us by Morten Hein. Retrocon is vitally important if we are to make old sources available electronically and I was glad to hear from Morten that OCR is on the agenda.

The user interface for the electronic library was discussed by many. Roland Hjerppe, the self confessed "info-junkie" and "techno-freak" reminded us that there are different notions of Virtual Library but that the steps in the virtualization of libraries all take the library to the workplace of the user. Achim Osswald talked of intelligent gateways, the problems and limitations. Anders Ardö, the digital librarian, and Traugott Koch talked about current solutions, in particular WAIS which they have implemented in Lund. Interestingly, development of these systems is very much through global collaboration. Let us hope this altruism will continue.

So called intelligent gateways to the Virtual Library require input from Librarians in the organization and evaluation of the information that can be accessed and, also, in the design of retrieval mechanisms needed to optimize their use.

In making a case for the expert reference librarian, Wilf Lancaster debunked artificial intelligence and blamed an over emphasis on technology for de-professionalization of librarians. (If Wilf did succeed in provoking me it was by claiming my computer is an erotic toy - do not tell my wife or she will not let me bring it to Essen again!) I should like to propose a solution to satisfy us all that I would call the Virtual Librarian. We would train our young librarians in the mould of Fat Boy's first assistant, and by a blend of video-conferencing and shared work spaces, they could be virtually popped up when needed to provide expert guidance. It should serve Herbert's societal preference for one to one instruction too, and even provide an intermediary function.

I am sure you will all join with me in congratulating and thanking the speakers, chair-people and, most of all Ahmed and his team, especially Doris and Joachim, for their exemplary organization and bountiful hospitality.

Ahmed we thank you and wish you well in your forthcoming 31st year.

## References

BRYANT, P. "Conference summary", in *Information technology and library management: 13th International Essen Symposium, 22 October - 25 October 1990: Festschrift in honour of Margaret Beckman*, edited by Ahmed H. Helal & Joachim W. Weiss. Universitätsbibliothek Essen, Essen, 1991, pp. 225-233.

WHITE, H.S. *"Librarians and the awakening from innocence: a collection of papers"*, G.K. Hall, Boston, Mass., 1989.

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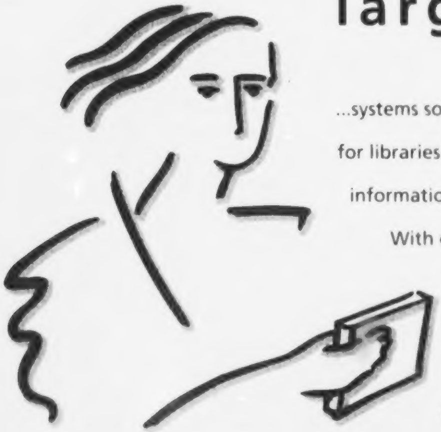

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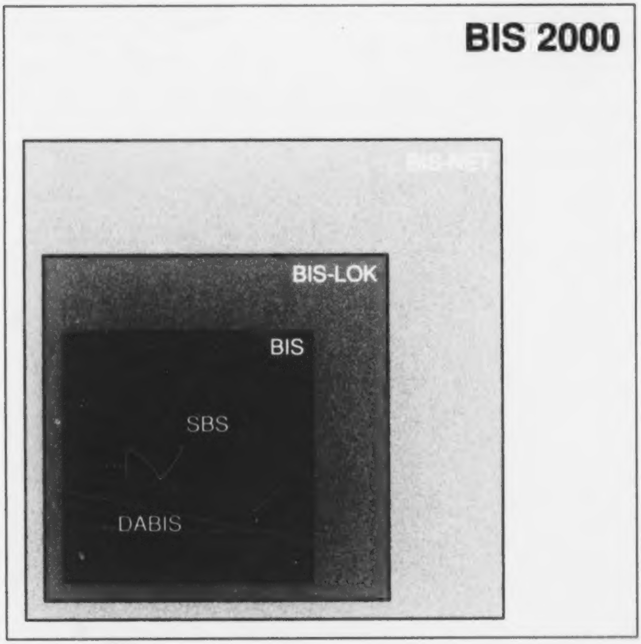

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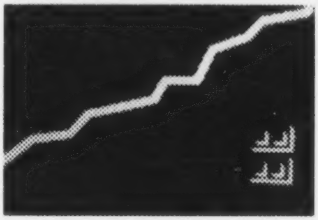

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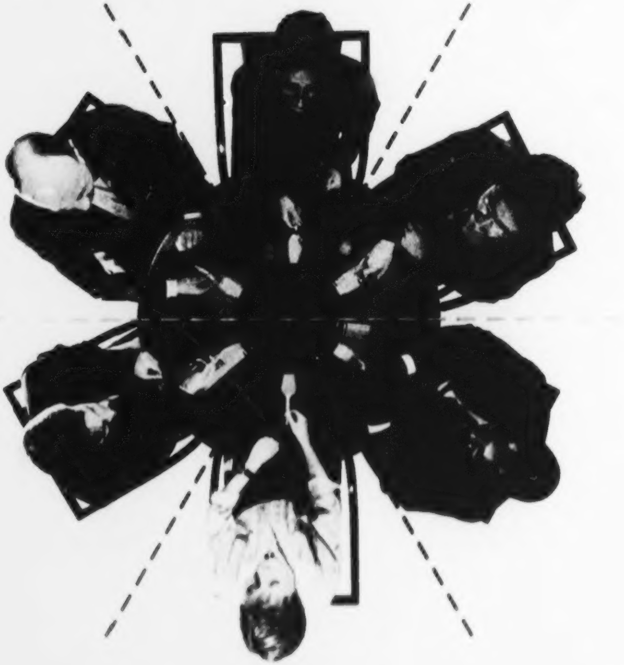

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*by* **W.E. Clason** *and* **S. Salem**

The word 'document' conjures up to most a medium of past or present information, which could be in the form of a clay tablet of antiquity or a modern encyclopaedia. It is justifiable, therefore, to assume that this Dictionary of Library Science, Information and Documentation encompasses several wide-ranging subjects. The fields covered are also closely related, a fact which can be attributed to the enormous impact of automation and technology.

In clarifying various topics, the author has listed specific documents - in itself an unusual approach which will do much to assist operational scientists. The inclusion of an Arabic supplement enhances the value of the dictionary which is an essential tool for libraries, documentation centres and specialists in the field.

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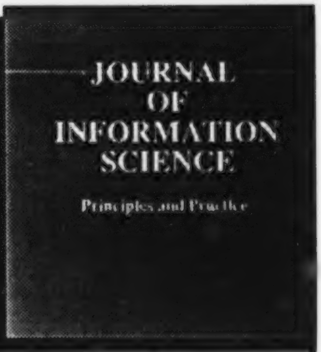

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